

Instructions for Electronic Forms, pg 1

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Intro	<p>Commercial Provision Chapters 1 - 5 of the 2015 Washington State Energy Code apply to all commercial occupancies, R-2, R-3 & R4 occupancies greater than 3 stories above grade, and R-1 occupancy (all building heights).</p> <p>This file, ENV15-v4.XLSM, has electronic compliance forms for general project information including Section C406, and envelope provisions as defined in Sections C101, C303, C402, C406, Chapter 5 (existing buildings) and Appendix A (default values) for Climate Zones 4c and 5b. There are two companion files: LTG15-v4.XLSM (Section C405 lighting and electrical systems), and MECH15-v4.XLSM (Section C403 and C404 mechanical and service water systems).</p>
Energy Code	<p>This form is a compliance aid and is not a substitute for the full energy code text or specific jurisdiction compliance requirements. Users should refer to the code text and contact the local jurisdiction for complete information. The full 2015 WSEC code text is available for download from the NEEC website:</p> <p>http://www.neec.net/energy-codes</p>
Start-up	Select this file from the NEEC website to download to your computer. When opening the file be sure to Enable Macros .
Overview	<p>This file is an Excel workbook that contains multiple compliance forms and resources in Excel worksheets. Each worksheet is indicated by a tab at the bottom of the screen. You may visit each worksheet by selecting it's tab. If you cannot see these tabs, select "Full Screen" in Excel.</p> <p>Most calculations are automated. Cells that display informational text and the results of calculations are write-protected and cannot be edited.</p>
Save Files	This file is saved in the same manner as any standard Excel file.
Getting Around	Some forms have two or more pages. Both pages are available on screen when you select the tab for a form (worksheet). Use the scroll bars to find the second page located below the first page.
Input Cells	<p>All general project information and the date are entered once on PROJ-SUM. This information is automatically replicated on all other ENV forms. The PROJ-SUM form accompanies all other ENV forms.</p> <p>Only input cells are accessible. If you try to edit a write-protected cell an error message will appear requesting a password. A password IS NOT required to complete these forms. You may use the TAB key to move to the next input cell. If the TAB doesn't take you where you want to go, use your mouse to move around the form.</p> <p>Avoid excessively long text strings when entering information. In some cases, text that extends beyond the available space will not be visible. In most cases the text will wrap within the cell. This may force part of the form onto a new page.</p> <p>To enter the date, use this format: mm/dd/yyyy. For example, you would enter 7/1/2018 or 12/21/2018.</p> <p>Check boxes can be checked or unchecked by clicking in the box with your mouse. Radio buttons (circles) allow only one in a set to be selected.</p> <p>Drop-down lists have an arrow at the right side of the cell. Click on the arrow with your mouse and select the appropriate option. Use the delete button on your computer to clear a drop-down entry.</p> <p>When a form has a space for notes or explanation, click anywhere in the space to edit.</p>
Personalizing	You can personalize the forms with your company name, address, phone, or any other information. This is done by editing the header or footer in Excel.
Adding Lines and Removing	<p>Many tables, such as for listing envelope assembly types, have a certain number of lines available for entering data. You may need more lines to enter all your information. Where this feature is available, you can add additional lines to the table by selecting the "+" button on the right hand side of the table with your mouse. If you can't see the "+" button, scroll to the right or increase the View Zoom setting for the worksheet.</p> <p>To remove lines that you have added, select the "-" button with your mouse. You cannot remove lines that were not added; an error message will appear if you try.</p> <p>If you add additional lines with this method, the pagination may be affected forcing the forms to carry additional lines over to other pages. Be sure to submit all pages to the plans examiner.</p>
Target Insulation Allowance	You must select an Target Insulation Allowance on ENV-SUM (line 17) to enable the forms.
Compliance Path	You must select a Compliance Path on ENV-SUM (line 18) to activate the correct input method for Window-to-Wall and Skylight-to-Roof ratios.

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Fenestration Area	<p>For projects complying via the Prescriptive Path, enter the vertical fenestration area, net wall area (includes everything except vertical fenestration), skylight area and net roof area (includes everything except skylights) directly into the Vertical Fenestration and Skylight Area Calculation input cells on the ENV-SUM form. The form will calculate the Window-to-Wall and Skylight-to-Roof ratios.</p> <p>For projects complying via the Component Performance Path, the Vertical Fenestration and Skylight Area inputs in the ENV-SUM form are write protected. Enter all applicable envelope information in the ENV-UA form. The resulting Window-to-Wall and Skylight-to-Roof ratios will auto fill into the ENV-SUM form from the ENV-UA form.</p>
Vertical Fenestration Alternates	<p>The prescriptive vertical fenestration target area is 30%. This target increases to 40% if the project complies with the requirements of C402.4.1.1 in buildings < 3 stories with 50% floor area in the daylight zone, C402.4.1.1 in buildings with ≥ 3 stories with 25% of net floor area in the daylight zone, C402.4.1.3 high performance vertical fenestration, or C402.4.1.4 dedicated outdoor air system (DOAS).</p> <p>If the project is eligible for one of these alternates, select the corresponding button on Line 34-39 of the ENV-SUM form. This will re-calculate the prescriptive target area in the ENV-SUM and ENV-UA forms based on 40%.</p>
Component Performance Calculation Adjustments	<p>If the project is a Change of Occupancy (per C503.2) or Space Conditioning (per C505) and the project will comply via component performance, then select checkbox in Line 19 of ENV-SUM to adjust UA calculation to allow proposed UA to be 10% higher than the Code target UA.</p> <p>If the project will comply with the Enhanced Envelope additional efficiency package option per C406.8, then an ENV-UA form to demonstrate component performance compliance is required. Select checkbox in Line 19 of ENV-SUM to adjust component performance calculation to test whether the proposed UA is 15% lower than the Code target UA.</p>
Target Area Adjustment	<p>Target Area Adjustment is required if the project exceeds the prescriptive target area for vertical fenestration or skylights. Adjusted target areas are automatically calculated in the ENV-UA form using envelope assembly areas you enter for your project. Adjusted target areas will appear in the Target UA column in the ENV-UA form. Refer to Target Area Adjustment worksheet for the supporting calculations.</p>
Printing	<p>The forms should print on any printer supported by your operating system. You will need to have the following TrueType fonts installed under Windows: Arial, Times New Roman, Courier New and Wingdings. These are all standard Windows fonts.</p> <p>If you are losing form details when printing, you may have a shortage of printer memory. Try printing problem pages individually.</p> <p>By default, only the active worksheet is printed. To print more than one worksheet at a time, open your print set-up menu and select either the page range you wish to print or Entire Workbook.</p> <p>Forms (worksheets) in a workbook may not be deleted because the file is locked.</p>
Blank Forms	<p>NEEC does not recommend completing these compliance forms by hand. Most worksheets run various calculations and compliance checks. For this reason, many jurisdictions do not accept these forms if not completed electronically. Verify with your jurisdiction prior to submitting forms completed by hand.</p> <p>To print blank forms to fill out by hand, delete all of the heading information at the beginning of ENV-SUM and select the desired Occupancy Group.</p> <p>For each radio button group there is a button labeled "Clear." Clicking this button will clear the other buttons so that they will print as empty circles. The "Clear" button will not print.</p>

End of Instructions for Electronic Forms

Project Summary, pg 1

PROJ-SUM

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

General Info <i>PROJ-SUM form shall be provided as a cover sheet for all compliance form submittals. Project Title shall match project plans title block.</i>	Project Title: 900 BUILDING RENOVATION	Date: 12/23/2019
	Project Street Address: 3700 NW ANDERSON HILL RD	For Building Department Use
	Project City, County, Zip: SILVERDALE, WA 98383	
	Project Owner or Rep: CENTRAL KITSAP SCHOOL DISTRICT	
	Jurisdiction: KITSAP COUNTY	

Project Description <i>Select all that apply to the scope of project.</i> <i>Select Addition + Existing or Alteration + Existing if the existing building will be combined with the addition or alteration to demonstrate compliance per Section C502.1 or C503.1.</i>	New Construction and Additions <input type="checkbox"/> New Building <input type="checkbox"/> Building Addition
	Existing Building Retrofit <input checked="" type="checkbox"/> Alteration <input type="checkbox"/> Change of Occupancy <input type="checkbox"/> Change in Space Conditioning <input type="checkbox"/> Historic Building Building Elements Scope - Select all that apply <input checked="" type="checkbox"/> All <input type="checkbox"/> Building Envelope <input type="checkbox"/> Mechanical Systems <input type="checkbox"/> Service Hot Water Systems <input type="checkbox"/> Lighting Systems <input type="checkbox"/> Electrical Systems

Occupancy Type	<input checked="" type="radio"/> All Commercial <input type="radio"/> Group R - R2, R3, & R4 over 3 stories and all R1 <input type="radio"/> Mixed Use <i>Mixed Use - Building is greater than three stories above grade and it has both Commercial and Group R occupancies.</i> <i>Mixed Occupancy - Building is three stories or less above grade and it has both Commercial and Group R2, R3 or R4 occupancies. Select All Commercial to document compliance for the commercial areas of the building. The residential spaces shall comply with the WSEC Residential Provisions.</i>
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Space Conditioning Categories	<i>Select all that apply to the scope of project</i> <input checked="" type="checkbox"/> Fully Conditioned <input type="checkbox"/> Semi-heated ² <input type="checkbox"/> Refrigerated Spaces (Warehouse and/or Walk-in ¹) <input type="checkbox"/> Low Energy Space Category ³
	Eligible Low Energy Spaces <input type="checkbox"/> Unconditioned <input type="checkbox"/> Low energy heating/cooling capacity <input type="checkbox"/> Wireless service equipment shelter <input type="checkbox"/> Greenhouse ⁴ <input type="checkbox"/> Equipment building

Floor Area and Stories	Floors Above Grade	Building Gross Conditioned Floor Area	Project Gross Conditioned Floor Area
	3	36,577	36,577

General Compliance Path	<input checked="" type="radio"/> Compliance Method 1 - General <input type="radio"/> Compliance Method 2 - Total Building Compliance Method 1 - Projects shall demonstrate compliance with all applicable mandatory and prescriptive requirements of this code. Refer to C401.2, Item 1 for more information. Compliance forms to include with a Prescriptive submittal: All applicable ENV, LTG, and MECH. Compliance Method 2 - Projects complying via total building performance (TBP) shall include a summary of results from a whole building energy model per Section C407 and shall demonstrate compliance with all applicable mandatory provisions in this Code. Refer to Section C401.2, Item 2 for more information. Compliance forms to include with a TBP submittal: PROJ-SUM, ENV-CHK, LTG-EXT, LTG-CHK, and all MECH forms except MECH-ECONO and MECH-VENT (pending).
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Note 1 - Refrigerated Spaces - They shall comply with the envelope and refrigeration equipment requirements in Section C410. Warehouse coolers and freezers shall also comply with the envelope requirements in C402. C410 takes precedent for overlapping requirements.

Note 2 - Semi-heated Spaces - If heated with equipment other than electric resistance may take an exemption for wall insulation. All other envelope assemblies shall comply with the thermal envelope provisions.

Note 3 - Exemptions For Low Energy Spaces - Low Energy spaces are exempt from all provisions in WSEC Section C402 Building Envelope, however all other applicable provisions in the Code do apply including lighting, mechanical, service water heating, etc.

Note 4 - Eligible Space Conditioning For Low Energy Greenhouses - Greenhouses are defined as spaces that maintain a specialized sunlit environment that is used exclusively for cultivation, protection and maintenance of plants. Cooling with outside air and/or evaporative cooling, and any form of heating equipment, are allowed under the Low Energy Greenhouse category. Greenhouses with cooling equipment that requires a condensing unit are NOT eligible.

Permit Number: 19-05911

Project Summary, pg 2

PROJ-SUM

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

General Info	Project Title:	900 BUILDING RENOVATION		Date	12/23/2019
C406 Additional Efficiency Package Options Summary <i>A minimum of two Options are required for new construction, and change in space conditioning or occupancy projects.</i> <i>Select all Options included in the current project scope. Also select Options complied with under previous projects (shell and core, other tenant)</i> <i>Buildings with multiple tenant spaces may comply with different options (mix & match).</i> <i>Options are required for all space conditioning categories.</i> <i>Include discipline specific information for C406 options in ENV-SUM, LTG-SUM and</i> <i>Refer to SBCC website for official interpretations regarding C406 provisions.</i>	Building level efficiency options:			Current Scope	Previous Projects
	C406.8 Enhanced envelope performance			<input type="checkbox"/>	<input type="checkbox"/>
	C406.9 Reduced air infiltration			<input type="checkbox"/>	<input type="checkbox"/>
	C406.5 On-site renewable energy			<input type="checkbox"/>	<input type="checkbox"/>
	Building area level efficiency options				
	C406.2 More efficient HVAC equipment			<input type="checkbox"/>	<input type="checkbox"/>
	C406.6 Dedicated outside air systems (DOAS)			<input type="checkbox"/>	<input type="checkbox"/>
	C406.7 Reduced energy use in service water heating			<input type="checkbox"/>	<input type="checkbox"/>
	C406.3 Reduced lighting power			<input type="checkbox"/>	<input type="checkbox"/>
	C406.4 Enhanced digital lighting controls			<input type="checkbox"/>	<input type="checkbox"/>
C406 Comments:					

Envelope Summary

ENV-SUM

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

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Project Info Applicant Info. Provide contact information for individual who can respond to inquiries about information provided.	Project Title: 900 BUILDING RENOVATION	Date: 12/23/2019
	Company Name: RICE FERGUS MILLER	For Building Department Use
	Company Address: 275 FIFTH STREET, SUITE 100	
	Applicant Name: RICE FERGUS MILLER	
	Applicant Phone: 360-362-1864	
	Applicant Email: mwright@rfmarch.com	

Project Description	<input type="checkbox"/> New Building <input type="checkbox"/> Addition <input checked="" type="checkbox"/> Alteration <input type="checkbox"/> No Envelope Scope
Envelope Project Scope Select all that apply.	<input checked="" type="checkbox"/> All Commercial <input type="checkbox"/> Group R - Commercial <input type="checkbox"/> Mixed Use - Commercial + Group R <input type="checkbox"/> Semi-heated <input type="checkbox"/> Refrigerated Cooler <input type="checkbox"/> Refrigerated Freezer <input type="checkbox"/> Equipment Building
Envelope Description Provide brief description of the project and relevant supporting documentation. If project includes multiple Target Insulation Allowance areas, and/or is demonstrating compliance as an Addition + Existing, Alteration + Existing, or Addition + Alteration + Existing project, provide a brief summary of the approach to whole building compliance.	THE SCOPE OF WORK INCLUDES SELECTIVE INTERIOR AND EXTERIOR MODIFICATIONS TO AN EXISTING BUILDING. ARCHITECTURAL DEMOLITION WORK WILL INCLUDE REMOVAL OF EXISTING NON STRUCTURAL INTERIOR WALLS, CEILINGS, FLOORING AND OTHER FINISHES AS SHOWN. MECHANICAL, ELECTRICAL, PLUMBING, AND STRUCTURAL INCLUDE UPDATES TO ALL SYSTEMS TO CURRENT CODE REQUIREMENTS OF SPECIFIC USES.
Air Barrier Testing Air barrier testing is required for all new construction projects. Testing criteria is 0.40 cfm/ft ² under test pressure of 0.3 inch w.g. To comply with C406.9, demonstrate that measured air leakage of building envelope	<input type="checkbox"/> Air barrier testing per Section C402.5.1.2 included in project scope <input type="checkbox"/> Additional Efficiency Package Option - C406.9 Reduced Air Infiltration C503.3 Exception - No change to space conditioning or <input checked="" type="checkbox"/> Testing not required. Explanation: occupancy or use.

Compliance Documentation Scope and Method	
Scope of This Calculation	<input type="checkbox"/> New Building <input type="checkbox"/> Addition <input type="checkbox"/> Alteration <input type="checkbox"/> No Envelope Scope
Target Insulation Allowance Sets the title and calculations in the compliance forms. Selection required to enable forms.	<input checked="" type="radio"/> Fully Conditioned - Commercial, Group R, Mixed Use <input type="radio"/> Semi-heated <input type="radio"/> Refrigerated Cooler <input type="radio"/> Refrigerated Freezer If project includes more than one Target Insulation Allowance area, and/or if project includes addition and alteration areas complying independently, for each area complete an ENV-SUM form Rows 16-46 and either an ENV-PRESCRIPTIVE form, or ENV-UA + ENV-SHGC forms if demonstrating compliance via component performance.
Envelope Compliance Path Selection required to enable forms.	<input checked="" type="radio"/> Prescriptive <input type="radio"/> Component Performance
Component Performance Calculation Adjustments	<input type="checkbox"/> Change of Occupancy (C503.2) / Conditioning (C505) - 10% higher UA allowed <input type="checkbox"/> Additional Efficiency Package Option - C406.8 Enhanced Envelope - 15% lower UA required

Additions <input type="radio"/> Addition stand alone <input type="radio"/> Addition + Existing Addition stand alone - Complete Vertical Fenestration and Skylight Area Calculation. Enter total existing-to-remain wall, roof, vertical fenestration and skylight areas as EXISTING. Enter total addition envelope assembly areas as NEW. If resulting total building WWR exceeds 30% and/or SSR exceeds 5%, refer to C502.2.1 and C502.2.2 for prescriptive compliance alternatives. If complying via component performance, complete ENV-UA per instructions for addition stand alone projects. Addition + existing - Complete ENV-UA per instructions for addition + existing projects.	
Alterations - Fenestration and Skylight	<input type="checkbox"/> Replacement windows only, or resulting total building WWR ≤ original WWR <input type="checkbox"/> Total building WWR increased by alteration <input type="checkbox"/> Replacement skylights only, or resulting total building SRR ≤ original SRR <input type="checkbox"/> Total building SRR increased by alteration WWR and SRR not increased - Vertical Fenestration and Skylight Area Calculation not required. WWR and/or SRR increased - Complete Vertical Fenestration and Skylight Area Calculation. Enter total existing-to-remain wall, roof, vertical fenestration and skylight areas as EXISTING. Enter total altered envelope assembly areas as NEW. If resulting total building WWR exceeds 30% and/or SSR exceeds 5%, refer to C503.3.2 and C503.3.3 for prescriptive compliance alternatives. If complying via component performance, complete ENV-UA per instructions for alteration + existing projects.

Permit Number: 19-05911

Envelope Summary, pg. 2

ENV-SUM

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Project Title: 900 BUILDING RENOVATION				Date: 12/23/2019	
Vertical Fenestration and Skylight Area Calculation <i>Prescriptive Path - Enter envelope sf values directly into this section of ENV-SUM for vertical fenestration, skylights, net walls and roof. For Additions and Alterations, refer to these sections in ENV-SUM for further instructions.</i> <i>Component Performance - When this Envelope Compliance Path is selected, write-protection of this section is enabled. Enter envelope sf values for all assemblies into the ENV-UA form. Envelope information from ENV-UA will auto-fill into this section of ENV-</i>		Total Vertical Fenestration Area (rough opening)	NET Exterior Above Grade Wall Area	Total Skylight Area (rough opening)	NET Exterior Roof Area
	New	388	0	216	0
	Existing	1,821	22,794	0	15,744
	Total	2,209	22,794	216	15,744
		Vertical Fenestration-to-Wall Ratio (WWR)	8.8%	Skylight-to-Roof Ratio (SRR)	1.4%
Vertical Fenestration Area Compliance		VERTICAL FENESTRATION AREA COMPLIES WITH MAXIMUM ALLOWANCE			
Skylight Area Compliance		SKYLIGHT AREA COMPLIES WITH MAXIMUM ALLOWANCE			
Vertical Fenestration Alternates		<input type="radio"/> High performance fenestration U-factors and SHGC per C402.4.1.3 <input type="radio"/> Dedicated outdoor air system per C402.4.1.4 and C403.6			
Show locations of qualifying daylight zone (DLZ) areas and ft ² on project plans. For Daylight Zone Area Calculations - a) Sidelight areas include primary + secondary daylight zone areas. b) Include overlapping toplight and sidelight daylight zone areas under Toplight. c) Net floor area definition in Chapter 2.		<input type="radio"/> In buildings ≥ 3 stories, 25% or more of NET floor area is in DLZ per C402.4.1.1 <input type="radio"/> In buildings < 3 stories, 50% or more of CONDITIONED floor area is within DLZ per C402.4.1.1 Daylight Zone Calculations			
		Not Selected. No Calculations Required	Sidelight Daylight Zone Area	Toplight Daylight Zone Area	Percent Daylight Zone Area
Spaces in Single Story Building Requiring Skylights In these spaces a minimum of 50% of the floor area shall be within a skylight daylight zone (DLZ). Refer to C402.4.2 for requirements. SRR = Skylight to roof ratio		List all enclosed spaces that exceed 2,500 ft ² , have ceiling height greater than 15 ft, and are space types required to comply with this provision. Indicate aperture with "AP" prefix (AP 1.1%)			
		Space	Space Area (ft ²)	DLZ Area (ft ²)	SRR or Aperture
Envelope Exemptions					
Low Energy and Semi-heated Spaces		Low energy spaces per C402.1.1 Item 1 are exempt from the thermal envelope provisions. Semi-heated spaces heated by systems other than electric resistance are exempt from wall insulation provision only per C402.1.1.1. Complete Low Energy and Semi-Heated Spaces table in MECH-SUM to verify eligibility based on installed peak heating and cooling capacity per sf.			
Equipment Buildings		Wall Insulation R-Value	Roof Insulation R-Value	Overall Average U-Factor	
Equipment buildings are exempt from the thermal envelope provisions per C402.1.2. The following shall be met to be eligible: building size ≤ 500 sf, average wall/roof U-factor ≤ U-0.20, electronic equipment load ≥ 7 watts/sf, heating system output capacity ≤ 17,000 btu/h. Cooling system capacity not limited.		Equipment Building Envelope			
		Electronic equipment power (watts/sf)			
		Heating system output capacity (Btu/hr)			
		Cooling capacity (Yes/No)			

Envelope Requirements Summary, pg 1

ENV-REQ

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

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Minimum Requirements for Prescriptive Compliance

This table summarizes prescriptive compliance requirements for opaque elements and fenestration. Refer to Tables C402.1.3, C402.1.4 and C402.4 in the 2015 WSEC for important footnotes that apply to these tables. Refer to Section C402 for all applicable requirements for each envelope element type and applicable exceptions. Refer to Section C410 for all applicable information for refrigerated spaces.

Prescriptive Path Occupancy Group	Table C402.1.3 Insulation Minimum R-Value		Table C402.1.4 Assembly Maximum U-factor	
	All Other	Group R	All Other	Group R
Opaque Elements				
Roofs				
Insulation Entirely above Deck	R-38 c.i.	R-38 c.i.	U-0.027	U-0.027
Metal Building (with thermal spacer block) ^{Note 3}	R-25 + R-11 Ls	R-25 + R-11 Ls	U-0.031	U-0.031
Attic and Other	R-49	R-49	U-0.021	U-0.021
Joist or single rafter	R-49	R-49	U-0.027	U-0.027
Walls, Above-grade				
Mass	R-9.5 c.i. ^{Note 6}	R-13.3 c.i.	U-0.104 ^{Note 6}	U-0.078
Mass transfer deck slab edge	No R-Value for prescriptive compliance		U-0.200	U-0.200
Metal Building	R-19 c.i.	R-19 c.i.	U-0.052	U-0.052
Steel Framed	R-13 + R-10c.i.	R-19 + R-8.5 c.i.	U-0.055	U-0.055
Wood Framed and Other	R-21 w/ int. frame	R-21 w/ int. frame	U-0.054	U-0.054
Below Grade Wall ^{Note 4}	Same as above grade		Same as above grade	
Floors				
Mass	R-30 c.i.	R-30 c.i.	U-0.031	U-0.031
Steel Joist	R-38 + R-10 c.i.	R-38 + R-10 c.i.	U-0.029	U-0.029
Wood Framed and Other	R-30	R-30	U-0.029	U-0.029
Slab-On-Grade Floors				
Unheated	R-10 for 24 in. (from top of slab)		F-0.54	F-0.54
Heated ^{Note 5}	R-10 perimeter & under entire slab		F-0.55	F-0.55
Opaque Doors				
Swinging	No R-Value for prescriptive compliance		U-0.37	U-0.37
Nonswinging (Roll-up or sliding)	R-4.75	R-4.75	U-0.34	U-0.34
	Table C402.4 - 0-30% of wall area, or 30%-40% per Section C402.4.1.1 DLZ or Section C402.4.1.4 DOAS		Section C402.4.1.3 High Performance Fenestration Option - 0-40% of wall area	
Fenestration ^{Notes 1,2}				
Assembly Maximum U-factor				
Vertical Fenestration				
Nonmetal framing	U-0.30	U-0.30	U-0.28	U-0.28
Metal framing (fixed)	U-0.38	U-0.38	U-0.34	U-0.34
Metal framing (operable)	U-0.40	U-0.40	U-0.36	U-0.36
Entrance doors	U-0.60	U-0.60	U-0.60	U-0.60
Skylights				
Skylights	U-0.50	U-0.50	U-0.50	U-0.50
Fenestration				
Assembly Maximum SHGC Factor				
Vertical Fenestration				
	PF<0.2: north - SHGC=0.53; all other SHGC=0.4 0.2 ≤ PF < 0.5: north - SHGC-0.58; all other - SHGC-0.48 PF ≥ 0.5: all orientations - SHGC-0.64		PF<0.2: north - SHGC=0.46; all other SHGC=0.35 0.2 ≤ PF < 0.5: north - SHGC-0.51; all other - SHGC-0.42 PF ≥ 0.5: all orientations - SHGC-0.56	
Skylights	SHGC-0.35		SHGC-0.35	
C410.2 Refrigerated Spaces Insulation				
Insulation Minimum R-Value				
Assembly Maximum U-factor				
Freezers - Walk-in and Warehouse				
Roof / Ceiling	R-32		U-0.030	
Wall	R-32		U-0.030	
Door	R-32		U-0.030	
Door - transparent reach-in	triple-pane, heat-reflective treated or gas			
Floor	R-28		U-0.035	
Coolers - Walk-in and Warehouse				
Roof / Ceiling	R-25		U-0.039	
Wall	R-25		U-0.039	
Door	R-25		U-0.039	
Door - transparent reach-in	double-pane, heat-reflective treated & gas fill, or comply with freezer door req.			
Floor	No Requirement			

Definitions:

Ls = Liner system -- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins. Refer to Section A102.2.5.4.

c.i. = Continuous insulation -- Insulation that is continuous across all structural members without thermal bridges other than service openings and penetrations by metal fasteners with a x-sectional area of less than 0.04% of the opaque surface area of the assembly. Components with more than 0.04% metal penetrations may be eligible to follow the alternate CI values below.

int = Intermediate framing -- Includes insulated headers, corners and interior partition wall to exterior wall intersections. Refer to Section A103.2 for framing definitions.

Footnote Summary:

Each table in the 2015 WSEC has footnotes applicable to specific information provided in the table. This footnote summary provides only abbreviated details from these footnotes. **Refer to 2015 WSEC for complete footnote information.**

Note 1 - Assembly descriptions can be found in Chapter 2 and Appendix A.

Note 2 - Use of assembly U-factors, C-factors and F-factors from Appendix A and Chapter 3 are required unless otherwise allowed by the provisions of this Code.

Note 3 - For metal building roofs where using R-value compliance method, a thermal spacer block with minimum thickness of 1/2-inch and minimum R-value of R-3.5 is required. Otherwise use the U-factor compliance method.

Note 4 - Where heated slabs are below-grade, they shall comply with the F-factor requirements for slab-on-grade heated slabs.

Note 5 - Heated slab F-factors shall be determined specifically for heated slabs. Unheated slab F-factors shall not be used.

Note 6 - CMU walls in all occupancies other than Group R may be eligible for reduced insulation if all provisions stated in applicable footnote are met. Refer to Footnote D in Table C402.1.4 or Footnote C in Table C402.1.3 for eligibility requirements.

Note 7 - Components with continuous insulation but with metal penetrations / connections may be eligible for alternate continuous insulation R-values if all provisions in applicable footnote are met. Refer to alternate prescriptive R-values in table below and Footnote G in Table C402.1.3 for eligibility requirements.

Alternate continuous insulation nominal R-values

This alternate nominal R-value compliance option is allowed for projects complying with all of the following:

1. The ratio of the cross-sectional area, as measured in the plane of the surface, of metal penetrations of otherwise continuous insulation to the opaque surface area of the assembly is greater than 0.0004 (0.04%), but less than 0.0012 (0.12%).
2. The metal penetrations of otherwise continuous insulation are isolated or discontinuous (e.g., brick ties or other discontinuous metal attachments, offset brackets supporting shelf angles that allow insulation to go between the shelf angle and the primary portions of the wall structure). No continuous metal elements (e.g., metal studs, z-girts, z-channels, shelf angles) penetrate the otherwise continuous portion of the insulation.
3. Building permit drawings shall contain details showing the locations and dimensions of all the metal penetrations (e.g., brick ties or other discontinuous metal attachments, offset brackets, etc.) of otherwise continuous insulation. In addition, calculations shall be provided showing the ratio of the cross-sectional area of metal penetrations of otherwise continuous

Assemblies with continuous insulation (see definition)	Alternate option for assemblies with metal penetrations, greater than 0.04% but less than 0.08%	Alternate option for assemblies with metal penetrations, greater than or equal to 0.08% but less than 0.12%
R-9.5ci	R-11.9ci	R-13ci
R-11.4ci	R-14.3ci	R-15.7ci
R-13.3ci	R-16.6ci	R-18.3ci
R-15.2ci	R-19.0ci	R-21ci
R-30ci	R-38ci	R-42ci
R-38ci	R-48ci	R-53ci
R-13 + R-7.5ci	R-13 + R-9.4ci	R-13 + R-10.3ci
R-13 + R-10ci	R-13 + R-12.5ci	R-13 + R-13.8ci
R-13 + R-12.5ci	R-13 + R-15.6ci	R-13 + R-17.2ci
R-13 + R-13ci	R-13 + R-16.3ci	R-13 + R-17.9ci
R-19 + R-8.5ci	R-19 + R-10.6ci	R-19 + R-11.7ci
R-19 + R-14ci	R-19 + R-17.5ci	R-19 + R-19.2ci
R-19 + R-16ci	R-19 + R-20ci	R-19 + R-22ci
R-20 + R-3.8ci	R-20 + R-4.8ci	R-20 + R-5.3ci
R-21 + R-5ci	R-21 + R-6.3ci	R-21 + R-6.9ci

End of Envelope Requirements Summary

Prescriptive Path, pg. 1

ENV-PRESCRIPTIVE

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Project Title:		900 BUILDING RENOVATION		Date		12/23/2019	
Target Insulation Allowance				For Building Department Use			
Fully Conditioned Space - Commercial, Group R, Mixed Use							
Fenestration Area as % gross above-grade wall area		8.8%	Max. Target:				
Skylight Area as % gross roof area		1.4%	Max. Target:	5.0%			
Vertical Fenestration Alternates:				None Selected on ENV-SUM		User Note	

Prescriptive compliance of envelope assemblies may be accomplished by providing insulation R-values per Table C402.1.3 or U-factors / F-factors per Tables C402.1.4 and C402.4. A single project may comply via R-values for some envelope assemblies and U-factors / F-factors for others. Note compliance method taken for each assembly in spaces provided.

Building Component			R-Value Method for Prescriptive Compliance			U-Factor/F-Factor Method for Prescriptive Compliance	
			Cavity Ins. R-Value	Continuous Ins. (CI) R-Value ¹	% Area of Metal Penetrations in CI ²	Assembly U-Factor	U-Factor Source ³
Provide plan/detail # of assembly and description							
Roofs	Deck	2" INSULATION ATOP 1/2" DECK - EXISTING DWGS				0.070	EKOTROPE WALL CALCULATOR
	Mtl Bld ⁴						
	Joist/Rfr						
	Attic/Oth						
Opaque Walls - Above Grade ¹⁵	Steel						
	Mtl Bld.						
	Wood/Oth ⁵						
	Mass ⁶	2.5" BRICK PLUS 8" CMU - EXISTING DWGS				0.330	EKOTROPE WALL CALCULATOR
	Transfer ⁷						
Group R Walls ¹⁵	Steel						
	Mass						
Below Grade Walls	Comm	11" CONCRETE - EXISTING DWGS				0.280	EKOTROPE WALL CALCULATOR
	Group R						
Floors	Mass						
	Framed ⁸						

Permit Number: 19-05911

Prescriptive Path, pg. 2

ENV-PRESCRIPTIVE

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Project Title: 900 BUILDING RENOVATION				Date: 12/23/2019			
Fenestration Area as % gross above-grade wall area 8.8% Max. Target: 30.0%				For Building Department Use			
Skylight Area as % gross roof area 1.4% Max. Target: 5.0%							
<i>If vertical fenestration or skylight area exceeds maximum allowed per C402.4.1, then the project must comply via Component Performance and provide ENV-UA and ENV-SHGC forms.</i>							
Building Component		R-Value Method for Prescriptive Compliance		U-Factor/F-Factor Method for Prescriptive Compliance			
Provide plan/detail # of assembly and description		Perim. Ins. R-Value	Full Slab CI R-Value	F-Factor	F-Factor Source ¹⁰		
Slab-on-grade ⁹	Unheated	4" CONCRETE SOG - EXISTING DWGS		0.690	EKOTROPE WALL CALCULATOR		
	Heated						
Provide ID from door schedule and description		Ins. R-Value		Assembly U-Factor	U-Factor Source ¹¹		
Opaque Doors	Swingin						
	Other						
		Solar Heat Gain Coefficient (SHGC)		U-Factor for Prescriptive Compliance			
Provide ID from window schedule and description		Projection Factor (PF) if applicable ¹²	Orientation (N or SEW) ¹³	Assembly SHGC ¹⁴	U-Factor Source ¹⁴		
Vertical Fenestration	Non-Metal						
	Metal, fixed	A60.02 SF-1	N/A	SEW	0.40	0.56	TRIFAB VG 451
		A60.02 SF-2 NORTH	N/A	N	0.53	0.45	TRIFAB VG 451
		A60.02 SF-2	N/A	SEW	0.40	0.45	TRIFAB VG 451
		A60.02 SF-4	N/A	SEW	0.40	0.43	TRIFAB VG 451
		A60.02 SF-5	N/A	SEW	0.40	0.45	TRIFAB VG 451
		A60.02 SF-6	N/A	SEW	0.40	0.45	TRIFAB VG 451
	Metal	A60.02 W-1	1.60	SEW	0.64	0.48	8225TL
		A60.02 W-2	1.60	SEW	0.64	0.47	8225TL
		A60.02 W-3	N/A	SEW	0.40	0.45	8225TL
		A60.02 W-4	1.60	SEW	0.64	0.48	8225TL
	Metal						
	entry						
	Beneath a slab-on-grade or exposed floor, this floor shall be thermally broken from the surrounding floor area with the same amount of insulation as required for the floor above.						
Skylights	A60.02 SL-1			0.50	0.62	2000 Skylight	

Miscellaneous - Refrigerated Spaces

Provide plan/detail # of assembly and description		Ins. R-Value			Assembly U-Factor	U-Factor Source
Freezer Floor ¹⁷						
Provide ID from window schedule and description		Cooler / Freezer	Double Pane Glass	Triple Pane Glass	Inert Gas Filled	Heat Reflective Treated Glass
In Door						

Permit Number: 19-05911

Glazin
Reach In

-
- Note 1** - Insulation that is continuous except for fasteners may be entered here if the cross-sectional area of metal penetration through otherwise continuous insulation is less than 0.12%.
- Note 2** - Alternate prescriptive continuous insulation R-values per Table C402.1.4, Footnote F may be used if the cross sectional area of metal penetrations exceeds 0.04% but is less than 0.12%. Calculations are required to use these alternate R-values.
- Note 3** - Opaque assembly U-factors shall come from Appendix A or calculated per approved method as specified in C402.1.5.1. Specify the table number or calculation page number.
- Note 4** - Thermal spacer blocking and liner system are required for prescriptive R-Value compliance in metal building roof assemblies. Note thermal spacer thickness and R-value in roof assembly description.
- Note 5** - Intermediate framing is required for prescriptive R-Value compliance in wood-framed wall assemblies.
- Note 6** - Proposed CMU mass walls in non-Group R that meet Table C402.1.4 Footnote C requirements can enter the target prescriptive U-value of 0.104.
- Note 7** - Mass transfer slab edges must be covered with an assembly having an overall U-factor of 0.2.
- Note 8** - Refer to Table C402.1.3, Footnote E for prescriptive R-Value requirement for steel floor joist assemblies.
- Note 9** - Prescriptive slab-on-grade insulation shall extend from top of slab to minimum length per an approved method as defined in C402.2.6.
- Note 10** - Slab-on-grade F-Factors shall come from Appendix A or calculated per approved method as specified in C402.1.5.1.
- Note 11** - Opaque door U-factors shall come from Appendix A or calculated per approved method as specified in C402.1.5.1. A door is defined as opaque if less than 50% of the door area has glazing.
- Note 12** - Refer to Equation C4-6 Projection Factor Calculation.
- Note 13** - N = Oriented within 45 degrees of true north, SEW = All other orientations.
- Note 14** - Fenestration assembly U-Factor and SHGC shall be the manufacturer's NFRC product rating, which includes the glazing and frame, or shall be the default value per Section C303.1.3.
- Note 15** - List all above-grade Group R mass walls and steel frame walls in Group R Walls section. List commercial above grade walls and all other Group R above grade walls in Opaque Walls - Above Grade.
- Note 16** - Refrigerated Coolers - All cooler roof, wall and door assemblies shall comply with the prescriptive R-values or U-factors per C410. Enter proposed information under the most similar assembly type. Slab edge insulation for slab-on-grade floors shall comply with C402. Floors that separate a cooler from a non-cooler space (unconditioned and conditioned) shall be insulated per C402. Vertical fenestration (not within cooler doors) shall comply with the prescriptive R-values or U-factors per C402. Enter only the opaque portion of refrigerated space doors. Windows within doors and reach-in display case doors shall comply with C410 prescriptive requirements.
- Note 17** - Refrigerated Freezers - All freezer roof, wall and door assemblies shall comply with the prescriptive R-values or U-factors per C410. Enter proposed information under the most similar assembly type. Freezer floor insulation shall comply with C410. Insulation is required under the entire freezer floor. If the freezer floor assembly rests on top of a standard floor, the vertical edge of the freezer floor shall be entered as and comply with the requirements for a freezer wall. If freezer floor insulation is installed as integral to or applied underneath a slab-on-grade or exposed floor, this floor shall be thermally broken from the surrounding floor area with the same amount of insulation as required for a freezer

Component Performance Path, pg. 1

ENV-UA

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Project Title: 900 BUILDING RENOVATION						Date: 12/23/2019		
Target Insulation Allowance Component Performance Not Selected						For Building Department Use		
Calculation Adjustments None Applied								
Fenestration Area as % gross above-grade wall area 8.8% Max. Target: 30.0%								
Skylight Area as % gross roof area 1.4% Max. Target: 5.0%								
Vertical Fenestration Alternates: None Selected on ENV-SUM								
For Stand-alone Projects^{13,14} Vertical Fenestration Net Wall						User Note		
Existing-to-remain Areas Skylights Net Roof								
Building Component Cavity+CI Plan/Detail # U-factor Source & Table # ²				Proposed UA U-factor x Area (A) = UA (U x A)		Target UA U-factor x Area (A) = UA (U x A)		
Roofs	Deck	R=					0.027	
		R=					Above Deck Insulation	U-0.027
		R=						
	Mtl Bld	R=					0.031	
		R=					Metal Building	U-0.031
		R=						
	Joist/Rft	R=					0.027	
		R=					Joist/single rafter	U-0.027
		R=						
Attic/Oth	R=					0.021		
	R=					Single raft, attic, other	U-0.021	
	R=							
Opaque Walls - Above Grade ^{4,6}	Steel	R=					0.055	
		R=					Steel/metal frame	U-0.055
		R=						
	Mtl Bld.	R=					0.052	
		R=					Metal Building	U-0.052
		R=						
	Wood/Oth	R=					0.054	
		R=					Wood Frame, other	U-0.054
		R=						
	Mass ³	R=					0.104	
		R=					Mass Wall	U-0.104
		R=						
Transfer ⁴	R=					0.200		
	R=					Mass Transfer Deck	U-0.20	
	R=							
Group R	R=					0.078		
	R=					Group R Mass Wall	U-0.078	
	R=							
Below Grade Walls ^{4,6}	Comm	R=					0.104	
		R=					Assumed to be Mass Wall	U-0.104
		R=						
	Group R	R=					0.078	
		R=					Assumed to be Mass Wall	U-0.078
		R=						
Floors	Mass	R=					0.031	
		R=					Mass Floor	U-0.031
		R=						
	Framed	R=					0.029	
		R=					Joist/Framing	U-0.029
		R=						

Area ¹	UA	Area ¹	UA
Page 1 Subtotal			

Component Performance Compliance (UA)

Component Performance Not Selected

Component Performance Path, pg. 2

ENV-UA

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Project Title: 900 BUILDING RENOVATION							Date: 12/23/2019		
Fenestration Area as % gross above-grade wall area 8.8% Max. Target: 30.0%							For Building Department Use		
Skylight Area as % gross roof area 1.4% Max. Target: 5.0%									
Building Component				Proposed UA			Target UA		
Ins. R Plan/Detail # F-factor Source & Table # ⁸				F-factor	x Perimeter	= FP(F x P)	F-factor	x Perimeter	= UA (U x A)
Slab-on-grade	Unheated	R=					0.540		
		R=					Slab-On-Grade F-0.54		
		R=							
	Heated	R=					0.550		
		R=					Heated Slab-On-Grade F-0.55		
Schedule ID				U-factor Source ^{9,10}			U-factor x Area (A) = UA (U x A)		
Doors ^{6,9}	Swingin						0.370		
					Opaque Swing Doors U-0.37				
Other							0.340		
				Opaque rollup & sliding U-0.34					
Vertical Fenestration ^{6,10}	Non-Metal						0.30		
					Non-Metal Frame U-0.30				
	Metal, fixed						0.38		
					Metal Frame, Fixed U-0.38				
	Metal, op.						0.40		
			Metal Frame, Operable U-0.40						
Mtl entrance							0.60		
				Metal Entrance Door U-0.60					
Skylights ¹⁰	All Types						0.50		
					All types U-0.50				
Refrigerated Space Freezer Floors				Proposed UA			Target UA		
CI Plan/Detail # U-factor Source & Table # ²				U-factor	x Area (A)	= UA (U x A)	U-factor	x Area (A)	= UA (U x A)
Freezer Floor	R=								
	R=						Freezer Floor		
	R=								

	Area ¹	UA		Area ¹	UA
Page 2 Subtotal					
Page 1 Subtotal					
Project Total					

TO COMPLY - The Proposed Total UA shall not exceed the Target Total UA.

Component Performance Compliance (UA)

Component Performance Not Selected

Refrigerated Space Windows In Doors^{11,12}

		Plan/Detail #	Description	Cooler / Freezer	Double Pane Glass	Triple Pane Glass	Inert Gas Filled	Heat Reflective Treated Glass
Glazing in Doors	In Door							
	Reach in							

- Note 1** - If vertical fenestration or skylight area exceeds maximum allowed per C402.4.1, then Target Area Adjustment of all applicable envelope elements will be calculated automatically by the compliance form. Refer to Target Area Adjustments worksheet for this calculation.
- Note 2** - Opaque assembly U-factors shall come from Appendix A or be calculated per approved method as specified in C402.1.5.1.
- Note 3** - Proposed CMU mass wall in non-Group R that meet Table C402.1.4 Footnote D requirements can enter the target U-value of 0.104.
- Note 4** - Semi-heated spaces - For spaces eligible for this wall insulation exception, the UA calculation excludes all wall assemblies. However, wall area values are required to run the window-to-wall ratio calculation. Enter into form all wall types in the semi-heated space. Enter the sf area of each wall type and enter "1" for the U-factor.
- Note 5** - Mass transfer slab edges must be covered with an assembly having an overall U-factor of 0.2.
- Note 6** - Demising walls, doors, and vertical fenestration separating spaces with different degrees of space conditioning (unconditioned, semi-heated, fully conditioned) shall be included only on the ENV-UA form for the space with the greatest degree of space conditioning.
- Note 7** - List Group R above grade mass walls here. List all other above grade walls, Commercial and Group R, in the Opaque Walls - Above Grade section.
- Note 8** - Slab-on-grade F-Factors shall come from Appendix A or calculated per approved method as specified in C402.1.5.1.
- Note 9** - Opaque door U-factors shall come from Appendix A or calculated per approved method as specified in C402.1.5.1. A door is defined as opaque if less than 50% of the door area has glazing.
- Note 10** - Fenestration assembly U-Factors shall be the manufacturer's NFRC product rating, which includes the glazing and frame, or shall be the default value per Section C303.1.3.
- Note 11** - Refrigerated Coolers - Target U-factors for cooler roof, wall and door assemblies are per C410. Enter proposed information under the most similar assembly type. Target F-factors for slab-on-grade floors are per C402. Target U-factors for floors that separate a cooler from a non-cooler space (unconditioned and conditioned) are per C402. Target U-factors for vertical fenestration (not within cooler doors) are per C402. Enter only the opaque portion of refrigerated space doors. Windows within doors and reach-in display case doors shall comply with C410 prescriptive requirements.
- Note 12** - Refrigerated Freezers - Target U-factors for freezer roof, wall and door assemblies are per C410. Enter proposed information under the most similar assembly type. Target U-factor for insulated freezer floors is per C410. Insulation is required under the entire freezer floor. Enter proposed information in the Freezer Floor section. If the freezer floor assembly rests on top of a standard floor, the vertical edge of the freezer floor shall be entered as a section of freezer wall. If freezer floor insulation is installed as integral to or applied underneath a slab-on-grade or exposed floor, this floor area shall be thermally broken from the surrounding floor. Enter proposed thermal break information in the Freezer Floor section and note it as In-Floor Thermal Break. Enter only the opaque portion of freezer doors. Windows within doors and reach-in display case doors shall comply with C410 prescriptive requirements.
- Note 13** - Stand alone projects - Enter total existing-to-remain sf areas for net above grade walls (including opaque doors), net roof, vertical fenestration and skylights in section provided at top of ENV-UA form. Enter UA information for new envelope assemblies in Building Components section.
- Note 14** - Addition + Existing, Alteration + Existing, Addition + Alteration + Existing projects - Enter sf areas and estimated U-factors for all existing-to-remain envelope assemblies in Building Components section. Identify these assemblies as EXISTING in U-factor Source & Table # column. Enter UA information for new addition and altered envelope assemblies in Building Components section. Existing and new information will

Vertical Fenestration Target Area Adjustment Calculations

Project Title:

900 BUILDING RENOVATION

Date

12/23/2019

If vertical fenestration area exceeds maximum allowed per Section C402.4.1, then Target Area Adjustment of all applicable envelope elements is required. This worksheet automatically calculates these adjustments and updates target areas in the ENV-UA and ENV-SHGC worksheets. Information shown in this worksheet is for reference only and is write-protected. Submit this Target Area Adjustment form with ENV-UA and ENV-SHGC forms.

VF = Vertical fenestration
DR = Opaque doors
AG = Above-grade

NW = Net above grade wall (excludes fenestration and doors.)
Gross Exterior Above-Grade Wall Area= VF + NW + DR

Proposed Areas

	Vertical Fenestration	Net Above Grade Wall	Opaque Door
Project Areas ->	VF=	NW=	DR=
Existing Non-project Areas ->	VF=	NW=	

Gross Exterior AG Wall Area	Max Vert. Fen. % (C402.3.1)	Maximum Target Vert. Fen. Area
	30.0%	
	X	100
	=	
Total Vertical Fenestration	Maximum Target	Delta Vertical Fenestration
		0
	-	↑ greater
	=	Excess Vertical Fenestration
Project Vertical Fenestration	Excess Vertical Fenestration	Target Vertical Fenestration
	-	
	=	Total Vertical Fenestration
Net AG Wall Area	Excess Fenestration	Target Net Wall Area
	+	
	=	Net Wall
		Target VF Multiplier
		Target Net Wall Mult.

Multiplier applied to all Proposed Vertical Fenestration Areas to calculate Target Vertical Fenestration Area

Multiplier applied to all Proposed Opaque Above-Grade Wall Areas to calculate Target Above-Grade Wall Area

Target Areas - UA Commercial

Vertical Fenestration	Proposed Area	Target VF Mult.	Target Area
Non-metal frame		X	
Metal frame, fixed		X	
Metal frame, operable		X	
Metal frame, entrance door		X	
Above-grade Wall	Proposed Area	Target Net Wall Mult.	Target Area
Steel Frame		X	
Metal Building		X	
Wood / Other frame		X	
Mass		X	
Mass Transfer Deck		X	
Group R Mass		X	
Sum of Proposed		Sum of Target	

Target areas in shaded boxes are applied to target areas on ENV-UA

Sum of target above-grade wall and vertical fenestration areas are calculated to equal the sum of proposed

Target Areas - SHGC x A

Non-North Vertical Fenestration	Proposed Area	Target VF Mult.	Target Area
PF < 0.2		X	
0.2 ≤ PF < 0.5		X	
PF ≥ 0.5		X	
North Vertical Fenestration	Proposed Area	Target VF Mult.	Target Area
PF < 0.2		X	
0.2 ≤ PF < 0.5		X	
PF ≥ 0.5		X	

SHGC target areas in shaded boxes are applied to target areas on ENV-SHGC

Skylight Target Area Adjustment Calculations

Project Title:

900 BUILDING RENOVATION

Date

12/23/2019

If skylight area exceeds maximum allowed per Section C402.4.1, then Target Area Adjustment of all applicable envelope elements is required. This worksheet automatically calculates these adjustments and updates target areas in the ENV-UA and ENV-SHGC worksheets. Information shown in this worksheet is for reference only and is write-protected. Submit this Target Area Adjustment form with ENV-UA and ENV-SHGC forms.

SKY= Skylight

NR - Net roof (excludes skylight)

Gross Exterior Roof Area = SKY + NR

Proposed Areas

		Skylight	Net Opaque Roof
Project Areas ->	SKY=		NR=
Existing Non-project Areas ->	SKY=		NR=
Gross Exterior Roof Area	X	Max Skylight % (C402.3.1)	Maximum Skylight Fenestration Area
		5.0%	100
		÷	=
Total Skylight Area	-	Maximum Target	Delta Skylight Area
			0
			↑ greater
			=
Project Skylight Area	-	Excess Skylight	Target Skylight Area
			÷
			=
Net Project Roof Area	+	Excess Skylight	Target Net Roof Area
			÷
			=

Multiplier applied to all Proposed Skylight Areas to calculate Target Skylight Area

Multiplier applied to all Proposed Opaque Roof Areas to calculate Target Roof Area

Target Areas - UA and SHGC x A

	Skylight	Proposed Area	Target SKY Mult.	Target Area
All			X	
Roof		Proposed Area	Target Net Roof Mult.	Target Area
Insulation Above Deck			X	
Metal Building			X	
Joist / Single Rafter			X	
Attic / All Others			X	
Sum of Proposed				Sum of Target

Target areas in shaded boxes are applied to target areas on ENV-UA

Sum of target roof and skylight areas are calculated to equal the sum of proposed

SHGC Calculation

ENV-SHGC

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Project Title: 900 BUILDING RENOVATION		Date: 12/23/2019
Target Insulation Allowance: Component Performance Not Selected		For Building Department Use
Fenestration Area as % gross above-grade wall area 8.8% Max. Target: 30.0%		
Skylight Area as % gross roof area 1.4% Max. Target: 5.0%		
Vertical Fenestration Alternates: None Selected on ENV-SUM		
Notes: 1 - Proposed vertical fenestration and skylight areas entered in ENV-SHGC must match proposed fenestration areas in ENV-UA. 2 - If Target Area Adjustment is required per ENV-UA, then target areas will be automatically adjusted in ENV-SHGC. Refer to Target Area Adjustments worksheet for this calculation. 3 - Fenestration assembly SHGC shall be the manufacturer's NFRC product rating, or shall be the default value per Section C303.1.3. 4 - Fenestration that separates conditioned space from a non-conditioned space shall be included in this worksheet. Enter target SHGC values for this fenestration under proposed SHGC, so it is neutral to the calculation.		
User Note		

Skylights		Proposed SHGC			Target SHGC		
Sch. ID	Provide SHGC source and fenestration schedule ID	SHGC	x Area (A)	= SHGC x A	SHGC	x Area (A)	= SHGC x A
					0.35		
					SHGC		0.35
Skylight Totals							

All Non-North Vertical Fenestration+			Proposed SHGC			Target SHGC ++		
Sch. ID	Provide SHGC source and fenestration schedule ID	PF	SHGC	x Area (A)	= SHGC x A	PF Category	SHGC	x Area (A) = SHGC x A
						PF < 0.2	0.40	
						0.2 ≤ PF < 0.5	0.48	
						PF ≥ 0.5	0.64	
						++ If projection factor (PF) credits are applied to the proposed design, Target SHGC will sum fenestration area by PF category.		
Non-North Window Totals								

+ If PF credit is applied, then vertical fenestration must be entered in the correct table according to orientation. If credit is not applied then all vertical fenestration can be entered in either table.

North Vertical Fenestration+			Proposed SHGC			Target SHGC++		
Sch. ID	Provide SHGC source and fenestration schedule ID	PF	SHGC	x Area (A)	= SHGC x A	PF Category	SHGC	x Area (A) = SHGC x A
						PF < 0.2	0.53	
						0.2 ≤ PF < 0.5	0.58	
						PF ≥ 0.5	0.64	
						++ If projection factor (PF) credits are applied to the proposed design, Target SHGC will sum fenestration area by PF category.		
North Window Totals								

TO COMPLY - The Proposed Total SHGC x A shall not exceed the Target Total SHGC x A.

Area	SHGC x A	Area	SHGC x A
Total (Skylight + Window)			

Component Performance Compliance (SHGC)

Compliance Performance Not Selected

Building Permit Plans Checklist, pg. 1

ENV-CHK

2015 WSEC Compliance Forms for Commercial Buildings including R2, R3, & R4 over 3 stories and all R1

Revised Oct 2017

Project Title: 900 BUILDING RENOVATION			Date: 12/23/2019		
The following information is necessary to check a building permit application for compliance with the building envelope requirements in the Washington State Energy Code, Commercial Provisions.					
Applicability (yes,no,na)	Code Section	Component	Compliance information required in permit documents	Location in Documents	Building Department Notes
SCOPE					
	C402.1.1	Low energy spaces	Identify low energy spaces on plans; include project information, and calculations if applicable, that demonstrate spaces are eligible for envelope provisions exemption		
	C402.1.1.1	Semi-heated spaces	Identify semi-heated spaces on plans, include calculations that demonstrate spaces are eligible for wall insulation exemption		
	C402.1.2	Equipment Buildings	Provide building area, average wall and roof U-factor, and installed equipment information that demonstrates equipment building is eligible for envelope provision exemption		
	C410.2	Walk-in and warehouse cooler and freezer spaces	Identify walk-in and warehouse cooler and freezer spaces on plans		
	C101.4.1	Mixed occupancy	Identify spaces with different occupancy requirements on plans		
	C503.2	Change of space conditioning	Identify on plans existing unconditioned spaces changing to semi-heated or conditioned space, and existing semi-heated spaces changing to conditioned space; provide calculations for existing and final level of space conditioning, and calculations that demonstrate alteration complies with current WSEC		
	C505.1	Change of occupancy	Identify on plans existing F, S and U-occupancy spaces undergoing a change in occupancy; provide calculations that demonstrate alteration complies with the current WSEC Identify on plans pre-2002 Group R spaces undergoing a change to a commercial occupancy; provide calculations that demonstrate alteration complies with the current WSEC Identify on plans non-Group R occupancy spaces undergoing a change to Group R; provide calculations that demonstrate alteration complies with the current WSEC		
ENVELOPE PROVISIONS					
	C103.2 C103.6.3	Compliance documentation	Indicate envelope insulation compliance path and provide applicable forms; ENV-PRESCRIPTIVE or ENV-UA / ENV-SHGC for component performance If complying via total building performance, provide a list of all proposed envelope component types, areas and U-values		
	C303.1.1 C303.1.2	Insulation identification	Indicate identification mark shall be applied to all insulation materials and insulation installed such that the mark is readily observable during inspection		
	C303.1.3 C402.4.3	Fenestration product rating	Fenestration products shall be labeled with rated U-factor, SHGC, VT, and leakage rating		
	C303.1.1 C402.2.1	General insulation installation	Indicate installation methods, thicknesses, densities and clearances to achieve the intended R-value of all insulation materials; Where two or more layers of rigid insulation will be used, indicate that edge joints between layers are staggered		
	C103.2 C402.2.2	Roof assembly insulation	Indicate R-value(s) of cavity/continuous insulation on roof sections; Indicate framing materials on roof sections; Indicate method of framing for ceilings below vented attics and vaulted ceilings per A102.2 (std, adv); Provide area weighted average U-factor calculation for insulation whose thickness varies by 1 inch or less; Indicate effective U-factors of tapered insulation entirely above deck per A102.2.6; include roof configuration and slope, maximum R-value at peak and minimum R-value at low point for all roof surfaces Indicate R-values for thermal spacers and each insulation layer, and liner system (LS) method for metal building roofs		
	C402.2.2	Skylight curb insulation	Indicate curb insulation R-value on roof section if not included in skylight NFRC rating		
	C103.2 C402.2.3 C402.2.4 C303.2.1	Above/below grade wall insulation	Indicate R-value(s) of cavity/continuous insulation on wall sections; Indicate framing materials on wall sections; Indicate method of framing for wood construction per A103.2 (std, int, adv); Indicate material density category, wall weight and heat capacity for qualifying mass walls; For qualifying ASTM C90 masonry walls, indicate loose-fill core insulation material and percentage of cores filled including grouted cores, bond beams, vertical fills, headers and any other grouted cores; Indicate method of protection of exposed exterior basement/crawlspace wall insulation		

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Applicability (yes,no,na)	Code Section	Component	Compliance information required in permit documents	Location in Documents	Building Department Notes
	C103.2 C402.4.4	Opaque doors	Indicate rated U-factor (swinging) or R-value (non-swinging - roll-up/sliding) on wall sections or in door schedules - applies to doors with less than 50% glazed area		
	C402.2.5	Floor over outdoor or unconditioned space insulation	Indicate R-value(s) of cavity/continuous insulation on floor sections; Indicate framing material on floor sections; Indicate material density category and weight of qualifying mass floors		
	C402.2.6 C303.2.1	Slab-on-grade floor insulation	Indicate R-value of continuous insulation on wall section or foundation detail; Indicate insulation extends down vertically and/or horizontally the required distance from top of slab; Indicate method of protection of exposed exterior slab edge insulation		
	C402.2.6 C303.2.1	Radiantly heated slab-on-grade floor insulation	Indicate R-value of continuous insulation on wall section or foundation detail; Indicate insulation extends down vertically from top of slab and then horizontally under the entire slab; Indicate method of protection of exposed exterior slab edge insulation		
	C402.2.8	Radiant heating system insulation	Indicate insulation R-value behind radiant panels, U-bend/headers and bottom surface of radiantly heated floors (other than radiantly heated slab-on-grade)		
	C402.4.1 C502.2.1 C503.3.2	Vertical fenestration maximum area	Provide calculation for total vertical fenestration area as a percentage of gross above grade wall area (WWR) for new construction, additions and alterations in ENV-SUM		
	C402.4.1.1 C405.2.4.1 C502.2.1 C503.3.2	Increased prescriptive maximum vertical fenestration area with daylight zones and controls	Provide calculations showing that the percentage of overall conditioned floor area within daylight zones is equal to or greater than 50% in 1 and 2 story buildings; OR Provide calculations showing that the percentage of overall net floor area within daylight zones is equal to or greater than 25% in buildings 3 stories or more; include the gross floor area and list of spaces omitted for the net floor area; Note in envelope plans that all lighting fixtures located within daylight zones shall be provided with daylight responsive controls per WSEC Section C405.2.4.1; indicate method of control in lighting fixture schedules Indicate that the VT of vertical fenestration is at least 1.1 times the rated SHGC		
	C402.4.1.3 C502.2.1 C503.3.2	Increased prescriptive maximum vertical fenestration area with high-	Indicate high performance U-factors and SHGC values in fenestration schedules; Indicate if an area-weighted U-factor is used for multiple fenestration elements within the same fenestration category per Table C402.3; provide U-factor calculations		
	C402.4.1.4 C403.6	Increased prescriptive maximum vertical fenestration area with DOAS mechanical systems	Indicate that for eligibility, all occupied, conditioned spaces will be served by a dedicated outside air system (DOAS) that delivers ventilation air without requiring operation of the heating/cooling system per Section C403.6		
	C402.1.5	Wall/vertical fenestration target area adjustment	Indicate if component performance with target area adjustment will be used to account for vertical fenestration area in excess of the prescriptive maximum allowed		
	C402.4.1 C502.2.2 C503.3.3	Skylight maximum area	Provide calculation for total skylight area as a percentage of gross roof area (SRR) for new construction, additions and alterations in ENV-SUM		
	C402.1.5.2	Roof/skylight target area adjustment	Indicate if component performance with target area adjustment will be used to account for skylight area in excess of the prescriptive maximum		
	C402.4.3 C303.1.3	U-factors, SHGC and VT for all fenestration assemblies	Indicate U-factors, SHGC and VT values in fenestration schedules; Indicate if an area-weighted U-factor is used for multiple fenestration elements within the same fenestration category per Table C402.3; provide U-factor calculations Indicate if values are NFRC or default; if default then specify frame type, glazing layers, gap width, low-e coatings, gas-fill		
	C402.4.3	Permanent shading devices	For windows with overhangs or permanent projection shading devices, provide projection factor calculations (Equation C4-6) and associated minimum SHGC for north and non-north orientations		

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	C402.4.2	Spaces in single story buildings requiring skylights	<p>In single story buildings, provide list of enclosed areas that exceed 2,500 sf; for each space identify the space use, floor area, floor to ceiling height, whether skylights are installed, and any exception taken;</p> <p>Provide calculations for percentage of conditioned floor area located within a daylight zone including skylight and eligible sidelight daylight zones;</p> <p>Provide calculations for percentage of skylight area in each space over 2,500 sf, OR;</p> <p>Provide calculations for skylight effective aperture (Equation C4-5) for each space over 2,500 sf;</p> <p>Indicate haze factor of skylight glazing material or diffuser</p>		
ADDITIONAL EFFICIENCY PACKAGE OPTION - ENHANCED ENVELOPE PERFORMANCE					
	C406.8	Enhanced envelope performance	To comply with additional efficiency package option, demonstrate envelope insulation compliance via component performance; provide ENV-UA / ENV-SHGC compliance forms; verify that building total UA is 15% lower than the Code target UA		
AIR LEAKAGE					
	C402.5.1.1	Air barrier construction and sealing	<p>Identify location and provide diagram of continuous air barrier in plans and sections;</p> <p>Provide details for all joints, transitions in materials, penetrations in air barrier and note method of sealing (caulked, gasketed, or other approved method)</p>		
	C402.5.3	Rooms containing open combustion fuel burning appliances used for space conditioning	<p>Indicate that room(s) containing non-direct vent appliances is isolated from conditioned space by the thermal envelope with a sealed air barrier, including doorway gasketing and sealing around ductwork and piping penetrations;</p> <p>Indicate insulation provided in wall, floor and ceiling of the room envelope, and insulation required on combustion air ductwork</p>		
	C402.5.4	Access openings and doors to shafts, chutes, stairways and doors	<p>Indicate locations of all access openings and doors to shafts, chutes, stairways and elevators;</p> <p>Indicate method of gasketing, weatherstripping and sealing of these openings</p>		
	C402.5.5 C403.2.4.3	Outdoor air intakes, exhausts and relief openings	<p>Indicate locations of all stairway enclosure, elevator shaft and building pressurization relief openings, outside air intakes and exhaust openings;</p> <p>Note in envelope plans that all relief, outside air intake and exhaust openings shall be provided with dampers in accordance with Mechanical Section C403.2.4.3</p>		
	C402.5.8	Recessed lighting in building envelope	<p>Indicate method of sealing between light fixture housing and wall or ceiling;</p> <p>Note in envelope plans that all recessed lighting fixtures shall be IC rated and have an air leakage rating not greater than 2 cfm per ASTM E283 test; include these requirements in lighting fixture schedules</p>		
	C402.5.6	Loading dock seals	Indicate weather seal at cargo and loading dock doors		
	C402.5.7	Vestibules	<p>Indicate locations and dimensions of vestibules and air curtains;</p> <p>Indicate exception and criteria utilized for all building entrances and exits that do not have a vestibule or air curtain;</p> <p>Indicate required performance for air curtains installed per exception 7;</p> <p>For unconditioned vestibules, indicate which envelope assembly (interior or exterior) complies with the requirements for a conditioned space</p>		
	C103.2 C402.5.1.2	Building air leakage test	<p>Indicate on plans the location of air barrier boundaries and area calculations on all six sides of the air barrier;</p> <p>Indicate air barrier test method in accordance with ASTM E779 or approved equivalent;</p> <p>Indicate required maximum leakage rate for compliance.</p> <p>Include the following requirements in project documents: (1) Submit air barrier test report to jurisdiction once test is completed; (2) If test results exceed 0.40 cfm/ft² (1.5 L/s*m²) at 0.3 in. wg (75 Pa), then visually inspect air barrier and seal noted sources of leakage; (3) Submit a follow-up report to jurisdiction noting corrective measures taken; (4) Include air barrier test report in compliance documentation provided to building owner.</p>		

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ADDITIONAL EFFICIENCY PACKAGE OPTION - REDUCED AIR INFILTRATION

	C406.9	Reduced air infiltration	To comply with additional efficiency package option, indicate in project documents that the air barrier test results shall not exceed 0.25 cfm/ft ² (0.94 L/s*m ²) at 0.3 in. wg (75 Pa); indicate air barrier test report shall be submitted to the jurisdiction and building owner once test is completed		
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ALTERATIONS

	C503.1	Roof alteration - insulation	For a roof alteration where existing ceiling cavities are exposed, indicate cavities are insulated to full depth at R-3 per inch		
	C503.3.1		For a roof covering replacement where insulation is installed entirely above the roof deck, indicate insulation complies with requirements for new construction per Tables C402.1.3 or C402.1.4		
	C503.1	Wall and floor alteration - insulation	For a wall or floor alteration (floor over outdoor or unconditioned space) where existing envelope cavities are exposed, indicate cavities are insulated to full depth at R-3 per inch		
	C503.3.2	Addition of vertical fenestration	Where the addition of new vertical fenestration results in total building window-to-wall ratio (WWR) exceeding the maximum allowed per C402.4.1, demonstrate method of compliance (vertical fenestration alternate per C503.3.2, or component performance compliance with target area adjustment for the total building)		
	C503.3.3	Addition of skylights	Where the addition of new skylights results in total building skylight-to-roof ratio (SRR) exceeding the maximum allowed per C402.4.1, demonstrate component performance compliance with target area adjustment for the total building		

PROJECT CLOSE OUT DOCUMENTATION

	C103.6.3	Project close out documentation requirements	Indicate in plans that project close out documentation is required including applicable WSEC envelope compliance forms and calculations, and fenestration NFRC rating certificates		
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If "no" is selected for any question, provide explanation:

End of Building Permit Plans Checklist

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