

NON RESIDENTIAL ENERGY PACKET

Envelope Summary (back)**ENV-SUM**

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

Revised December 2010

Minimum Requirements for Prescriptive Option		Use table to determine if project qualifies for the optional Prescriptive Option. All components must meet the stated		
Climate Zone	Climate Zone 1		Climate Zone 2	
Occupancy Group	Nonresidential	Residential, Other than Single-Family	Nonresidential	Residential, Other than Single-Family
Opaque Elements	Insulation Min. R-Value			
Roofs				
Insulation Entirely above Deck	R-30 c.i.	R-38 c.i.	R-38 c.i.	R-30 c.i.
Metal Building	R-25 + R-11 Ls	R-25 + R-11 Ls	R-25 + R-11 Ls	R-25 + R-11 Ls
Single-Rafter	R-38	R-38	R-38	R-38
Attic and Other	R-38 adv or R-49	R-38 adv or R-49	R-38 adv or R-49	R-38 adv or R-49
Walls, Above-grade				
Mass	R-5.7 c.i. ¹	R-11.4 c.i. ¹	R-7.6 c.i.	R-13.3 c.i.
Metal Building	R-13 + R-7.5 c.i.	R-19 + R-8.5 c.i.	R-13 + R-7.5 c.i.	R-19 + R-16 c.i.
Steel Framed	R-13 + R-7.5c.i.	R-19 + R-8.5 c.i.	R-13 + R-7.5 c.i.	R-19 + R-14 c.i.
Wood Framed and Other	R-21	R-13 + R- 6 c.i.	R-13 + R-7.5 c.i., or R-21 + R-2.5 c.i.	R-21 + R-5 c.i.
Below Grade Wall	Same as above grade		Same as above grade	
Floors				
Mass	R-30 c.i.	R-30 c.i.	R-30 c.i.	R-30 c.i.
Steel Joist	R-38 + R-4 c.i.	R-38 + R-4 c.i.	R-38 + R-4 c.i.	R-38.0 + R-4 c.i.
Wood Framed and Other	R-30	R-30	R-30	R-30
Slab-On-Grade Floors				
Unheated	R-10 for 24 in. (with thermal break)	R-10 for 24 in. (with thermal break).	R-10 for 24 in. (with thermal break)	R-10 for 24 in. (with thermal break)
Heated	R-10 c.i.(with thermal break)	R-10 c.i. (with thermal break)	R-10 c.i. (with thermal break)	R-10 c.i. (with thermal break)
Opaque Doors	Maximum U-Factor			
Swinging	U-0.600	U-0.400	U-0.600	U-0.400
Non-Swinging	U-0.600	U-0.400	U-0.600	U-0.400
Fenestration 0-40% of Wall	Assembly Maximum U-factor (NFRC Rated)			
Vertical Fenestration				
Nonmetal framing	U-0.32	U-0.32	U-0.32	U-0.32
Metal framing	U-0.40	U-0.40	U-0.4p0	U-0.40
Entrance doors	U-0.60	U-0.60	U-0.60	U-0.60
Skylights				
Without curb (i.e. sloped)	U-0.50	U-0.50	U-0.50	U-0.50
With curb (i.e. individual unit)	U-0.60	U-0.60	U-0.60	U-0.60
Fenestration 0-40% of Wall	Assembly Maximum SHGC Factor			
Vertical Fenestration	SHGC-0.40 all, OR SHGC-0.45 all PLUS permanent PF > 0.50 on west, south, east	No Requirement	SHGC-0.40 all, OR SHGC-0.45 all PLUS permanent PF > 0.50 on west, south, east	No Requirement
Skylights	SHGC-0.35	SHGC-0.35	SHGC-0.35	SHGC-0.35

The following definitions apply: c.i. = continuous insulation, Ls = liner system (see definitions)

Footnote 1: Zone 1, nonresidential walls may be ASTM C90 concrete block walls, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with material having a maximum thermal conductivity of 0.44 Btu-in/h-ft²·F.

Envelope UA Calculations

ENV-UA

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

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Project Address 1 - Always fill out this line on ENV-SUM1	Date 02/14/2011
Occupancy Group <input type="radio"/> Nonresidential <input type="radio"/> Multifamily residential <input type="checkbox"/> Clear	For Building Department Use
Climate Zone <input type="radio"/> Zone 1 <input type="radio"/> Zone 2	
Fenestration Area as % gross exterior wall area Max. Target:	
Notes: 1: If fenestration area exceeds maximum allowed, then calculate adjusted areas on Target Area Adjustment sheet on the backside of the ENV-SHGC form. 2: U-factors shall come from chapter 10 or calculated per 1332.	
See the ENV-CHK worksheet for example of how to complete the rows on this form.	

Building Component		Proposed UA		Target UA		
Provide assembly ID & page/plan # for each bldg. element		U-factor	x Area (A) = UA (U x A)	U-factor	x Area (A) = UA (U x A)	
Roofs	Deck	R= ID:				
		R= ID:		Above Deck Insulation	set occ.	
		R= ID:				
	Mtl Bld	R= ID:				
		R= ID:			Metal Building	set occ.
		R= ID:				
	Other	R= ID:				
		R= ID:			Single raft, attic, other	set occ.
		R= ID:				
Opaque Walls - Above	Metal Frm	R= ID:				
		R= ID:			Steel frame/metal bldg	set occ.
		R= ID:				
	Wood/Oth	R= ID:				
		R= ID:			Wood Frame, other	set occ.
		R= ID:				
		R= ID:				
	Mass*	R= ID:			Mass Wall	set occ.
		R= ID:				
		R= ID:				
R= ID:						
Proposed assembly U-factor from Tables 10-5 thru 10-5B						
Below Grade Walls	R= ID:					
	R= ID:			Assumed to be Mass Wall	set occ.	
	R= ID:					
Proposed assembly U-factor from Tables 10-5 thru 10-5B. Do NOT use Table 10-1.						
Opaque Doors	U= ID:			All Doors	set occ.	
	U= ID:					
	U= ID:					
Floors	R= ID:			Floors	set occ.	
	R= ID:					
	R= ID:					
		F-factor	x Perimeter = UA(U x A)	F-factor	x Perimeter = UA (U x A)	
Slab-on-grade	Unheated	R= ID:				
		R= ID:			Slab-On-Grade	set occ.
		R= ID:				
	Heated	R= ID:				
		R= ID:			Heated Slab-On-Grade	set occ.
Proposed assembly F-factors can use the unheated values in Table 10-2						

*Zone 1 CMU walls meeting Table 13-1 Footnote 1 can be entered with U-value of 0.15 rather than Table 10-5b values. Plans must clearly state footnote requirements.

	Area	UA		Area	UA
Page 1 Subtotal					

Envelope UA, continued.

ENV-UA

Project Address		1 - Always fill out this line on ENV-SUM1		Date	02/14/2011	
Fenestration Area as % gross exterior wall area				Max. Target:	For Building Department Use	
Notes: 1: If fenestration area exceeds maximum allowed, then calculate adjusted areas on Target Area Adjustment sheet on the backside of the ENV-SHGC form.						
2: Provide NFRC or Table 10-6 U-factor (See Section 1312.1) for fenestration assembly (combined See the ENV-CHK worksheet for example of how to complete the rows on this form.)						
Building Component		Proposed UA		Target UA		
Provide assembly ID & page/plan # for each bldg. element		U-factor	x Area (A) = UA (U x A)	U-factor	x Area (A) = UA (U x A)	
Vertical Fenestration	Metal Frame	U= ID:		Metal Frame set occ.		
		U= ID:				
		U= ID:				
		U= ID:				
	Non-Metal	U= ID:		Non-Metal Frame set occ.		
		U= ID:				
		U= ID:				
		U= ID:				
Mtl entrance	U= ID:		Metal Entrance Door set occ.			
	U= ID:					
	U= ID:					
	U= ID:					
Skylights	No Curb	U= ID:		Without Curb set occ.		
		U= ID:				
		U= ID:				
		U= ID:				
	With Curb	U= ID:		Including Curb set occ.		
		U= ID:				
		U= ID:				
		U= ID:				

	Area	UA		Area	UA
Page 2 Subtotal					
Page 1 Subtotal					
Total					

To comply:

- 1) Proposed Total UA shall not exceed Target Total UA.
- 2) Proposed Total Area shall equal Target Total Area.

SHGC Calculation

ENV-SHGC

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

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Project Address 1 - Always fill out this line on ENV-SUM1		Date 02/14/2011
Fenestration Area as % gross exterior wall area	Prop	Max. Target
Prescriptive PF Credit	<input type="radio"/> Yes <input type="radio"/> No	
Vertical North Facing Credit (1323.3 Exp. 2)	<input type="radio"/> Yes <input type="radio"/> No	
Notes: To comply the Proposed total SHGC x A for all fenestration (vertical & skylights) shall not exceed Target total SHGC x A. If the north facing credit is used then the north and non-north must comply separately with skylights being included with the non-north vertical fenestration.		

Skylights	Proposed SHGC	Target SHGC
List ID & page #, NFRC or glass only	SHGC* x Area (A) = SHGC x A	SHGC x Area (A) = SHGC x A
ID:		
ID:		Criteria SHGC
ID:		All set occ.
ID:		
ID:		

* Note: Manufacturer's SC may be used in lieu of SHGC. Nonresidential compliance is based upon combined skylight and vertical fenestration performance. Residential compliance is based upon skylight only.

Totals			Totals		
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All Non-North Vertical Fenestration++	Proposed SHGC				Target SHGC	
List ID & page #, NFRC or glass only	SHGC+	PF	PF Mult*	Adjusted SHGC	x Area (A) = SHGC x A	SHGC x Area (A) = SHGC x A
ID:						
ID:						Criteria SHGC
ID:						All set occ.
ID:						Prescriptive PF set occ.
ID:						
ID:						
ID:						
ID:						

++Note: If projection factors or north vertical glazing credit are used then vertical fenestration must be entered according to orientation. If neither are used then vertical fenestration can be entered in either section.
 + Note: Manufacturer's SC may be used in lieu of SHGC. Fenestration that separates conditioned space from a non-conditioned or semi-conditioned space shall be listed here with a proposed SHGC equal to the target value.
 * Note: Multipliers only apply if prescriptive PF credit not used.

Totals			Totals		
Non-North Total			Non-North Total		

North Vertical Fenestration++	Proposed SHGC				Target SHGC		
List ID & page #, NFRC or glass only	SHGC+	PF	PF Mult*	Adjusted SHGC	x Area (A) = SHGC x A	SHGC	x Area (A) = SHGC x A
ID:							
ID:						Criteria Mixed North	
ID:						Orientation Separate	
ID:						All set occ. set occ.	
ID:						Prescript P set occ. set occ.	
ID:							

North Total			North Total		
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For compliance: Proposed total SHGC x A shall not exceed Target total SHGC x A. If north glazing credit is used then north facing vertical fenestration must comply separately from non-north vertical fenestration and skylights.

Grand Total			Grand Total		
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Target Area Adjustment Calculations

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

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Project Address 1 - Always fill out this line on ENV-SUM1

Date 02/14/2011

If the total fenestration area as a % of gross exterior wall area (calculated on ENV-SUM) exceeds the maximum allowed in Table 13-1, then this calculation must be submitted. Use the resulting areas in the Target UA and SHGC calculations above.

SKY= Skylight. Referred to as overhead glazing in WSEC 1333 & 1334 and equations 13-1 & 13-2.
 VF = vertical fenestration. Referred to as vertical glazing in WSEC 1333 & 1334 and equations 13-1 & 13-2.
 NW = net wall (excludes fenestration, BG, and doors.)
 DBG = Doors and below grade wall.
 Total Fenestration = SKY + VF.
 Gross Exterior Wall Area = VF + NW + DBG

Proposed Areas

	Above Grade Walls	Doors & BG Walls
Fenestration ->	SKY=	VF=
Opaque ->	NW=	DBG=

Gross Exterior Wall Area X Max Fenestration % (Table 13-1) ÷ 100 = Maximum Target Fenestration Area

Total Fenestration - Maximum Target = Excess Fenestration - 0 lesser = Excess Fenestration

Total Fenestration - Excess Fenestration = Target Fenestration ÷ Total Fenestration = Target VF Multiplier

Net AG Wall Area + Excess Fenestration = Target Net Wall Area ÷ Net Wall = Target Net Wall Mult.

Apply to all Proposed Fenestration Areas to get Target Fenestration Area
 Apply to all Proposed Opaque AG Wall Areas to get Target Area

	Proposed Area	X	Target VF Mult.	=	Target Area
Vertical Fenestration	metal frame				
	non-metal frame				
	metal entrance				
Skylight	without curb				
	with curb				
AG Wall	Steel Frame/metal				
	Wood/Other frame				
	Mass				
Sum of Proposed			Sum of Target		

Target areas in shaded boxes shall be used as target areas on ENV-UA.

Sum of Proposed must equal Sum of Target.

	Proposed Area	X	Target VF Mult.	=	Target Area
SHGC Calculation					
Skylights (all)					
Non-North Vertical Fenestration					
North Vertical Fenestration					

SHGC target areas in shaded boxes shall be entered as target areas on ENV-SHGC

Building Permit Plans Checklist ENV-CHK

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential Revised December 2010

Project Address 1 - Always fill out this line on ENV-SUM1	Date 2/14/2011
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The following information is necessary to check a building permit application for compliance with the building envelope requirements in the Washington State Nonresidential Energy Code.

Applicability (yes,no,na)	Code Section	Component	Information Required	Location on Plans	Building Department Notes
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GENERAL REQUIREMENTS (Sections 1301-1314)

	1301	Scope	Unconditioned spaces identified on plans if allowed		
	1310.2	Semi-heated spaces	Semi-heated spaces identified on plans if allowed		
	1310.3	Cold Storage / refrigerate	All refrigerated spaces identified on plans. ENV-RFG completed.		
	1311	Insulation			
	1311.1	General installation	Indicate installation method, densities and clearances to achieve intended R-value of all insulation materials		
	1311.2	Roof/ceiling insul.	Indicate R-value on roof sections for attics and other roofs; Indicate clearances for attic insulation; Indicate baffles if eave vents installed; Indicate face stapling of faced batts		
	1311.3	Wall insulation	Indicate R-value and framing material on wall sections; Indicate face stapling of faced batts; Indicate above grade exterior insulation is protected; Indicate mass of masonry walls if mass wall claimed Indicate loose-fill core insulation for masonry walls as necessary Indicate frequency of grouted cores and bond beams as necessary		
	1311.4	Floor insulation	Indicate R-value on floor sections; Indicate substantial contact with surface; Indicate supports not more than 24" o.c.; Indicate that insulation does not block airflow through foundation vents.		
	1311.5	Slab-on-grade floor	Indicate R-value on wall section or foundation detail; Indicate slab insulation extends down vertically 24" from top; Indicate above grade exterior insulation is protected		
	1311.6	Radiant floor	Indicate R-value on wall section or foundation detail; Indicate slab insulation extends down vertically 36" from the top; Indicate above grade exterior insulation is protected; Indicate insulation also under entire slab where req'd. by Official		
	1312	Glazing and doors	Provide calculation of vertical and overhead glazing area as percent of gross wall area		
	1312.1	U-factors	Indicate glazing and door U-factors on glazing and door schedule (provide area-weighted calculations as necessary); Indicate if values are NFRC or default, if default then specify frame type, glazing layers, gapwidth, low-e coatings, gas filling		
	1312.2	SHGC & SC	Indicate glazing solar heat gain coefficient or shading coefficient on glazing schedule (provide area-weighted calculations by orientation as necessary)		
	1313	Moisture control			
	1313.1	Vapor retarders	Indicate vapor retarders applied to warm side of insulation		
	1313.2	Roof/ceiling vap. ret.	Indicate vapor retarder on roof section; or list exception Indicate vap. retard. with sealed seams for non-wood structure		
	1313.3	Wall vapor retarder	Indicate vapor retarder on wall section		
	1313.4	Floor vapor retarder	Indicate vapor retarder on floor section		
	1313.5	Crawl space vap. ret.	Indicate required grade ground cover with required overlapping.		
	1314	Air leakage			
	1314.1	Bldg. envel. sealing	Indicate sealing, caulking, gasketing, and weatherstripping		
	1314.2	Glazing/door sealing	Specify maximum air leakage rates for fenestration and door products		
	1314.3	Assemb. as ducts	Indicate sealing, caulking and gasketing		
	1314.4	Recessed Lighting Fixture	Indicate IC rating, ASTM E283 cert., and gasketing or caulking to ceiling		
	1314.5	Loading Dock Seal	Indicate weatherseal at cargo and loading dock doors		
	1314.6	Continuous Air Barrier	Indicate air barrier sealing on all roof, wall & floor details Indicate leakage testing method. Provide testing results to building official. Max. leakage of 0.40 cfm/ft ² at 0.3 inch w.g.		

PRESCRIPTIVE PERFORMANCE (Sections 1320-1323)

		ENV-SUM Form	Completed and attached.		
	1323	Glazing	Indicate number of glazing panes and location of emissivity coating or exception taken		

COMPONENT PERFORMANCE (Sections 1330-1338)

		ENV-SUM, ENV-JA, & ENV-SHGC Forms	Completed and attached.		
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If "no" is shown for any question, provide explanation:

ENV-UA INSTRUCTIONS & EXAMPLES**ENV-CHK**

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily

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FENESTRATION, SKYLIGHTS, & DOORS: Per Energy Code Section 1312.1,

- *U-factors shall be "determined, certified, and labeled in accordance with RS-31 by a certified independent agency licensed by the National Fenestration Rating Council (NFRC)." If using this approach, provide manufacturer, model number and NFRC rating on the drawings.*
- *"Unlabeled glazing and doors shall be assigned the default U-factor in Table 10-6." If using this approach, provide all glazing characteristics on the drawings: list number of glazing layers, gap width, low-e coating, gas fill, frame material, thermal break details per footnote 2 to Table 10-6B.*

OPAQUE ASSEMBLIES: Per Energy Code Section 1332,

- *"The U-factors for typical construction assemblies are included in Chapter 10. These values shall be used for all calculations." For example: see Table 10-5A for metal stud walls and metal building walls/roofs, see Table 10-7A to E for steel truss ceilings, etc.*

FURTHER INFORMATION: Refer to the Northwest Energy Efficiency Council website at: www.neec.org**Below are examples of how the Component Information on ENV-UA-1 are to be completed**

Building Component List ID & page #, code table # or calculation page #		Proposed UA U-factor x Area (A)		Typical Example
Roofs				
Other	R= 38 ID: R1/A1.5, T.10-7 default	0.031	532	R-38 blown-in attic insulation per default
Deck	R= 40 ID: R2/A1.5, T.10-7G default	0.025	9885	R-40 uniform thickness rigid insulation per default
Walls				
Opaque	R=13+7.5 ID: W1/A1.6, T.10-5A(1) default	0.064	7587	R-13 cavity + R-7.5 rigid ins. over metal studs per default
	R= 5 ID: W2/A1.6, T.10-5B(2) default	0.157	923	R-5 rigid ins. at edge of intermediate concrete floors per def
	R= ID: R= ID:			
BG	R= 11 ID: W4/A1.6, T.10-5(1) default	0.094	512	R-11 cavity ins. between wood studs on conc. wall per def.
	R= ID:			
Doors				
	U= 0.6 ID: D1/A1.3, T.10-6 default	0.60	120	Non-NFRC fire-rated exit door per default
	U= 1.2 ID: D2/A1.3, T.10-6 default	1.20	40	Non-NFRC warehouse door per default
Floors and Slabs				
Floor	R= 30 ID: F1/A1.7, T.10-4A default	0.031	10417	R-30 continuous ins. under concrete floor slab per default
	R= ID:			
Slab	R= 10 ID: F2/A1.7, T.10-2 default	0.700	612	R-10 slab edge ins. for 2 feet without thermal break per def.
Fenestration and Skylights				
Vertical	ID: W1/A1.3, NFRC certified	0.36	12307	Curtainwall rated, certified, and labeled per NFRC
	ID: W2/A1.3, T.10-6 default	0.50	5240	Non-NFRC curtainwall, 2 layer, 0.05emis, argon, TB, fixed
	ID: W3/A1.3, T.10-6 default	0.65	282	Non-NFRC curtainwall, 2 layer, 0.05emis fixed
	ID: W3/A1.3, T.10-6 default	0.78	282	Non-NFRC curtainwall, 2 layer, 0.05emis operable
Sky Light	ID: S1/A1.3, NFRC certified	0.50	453	Sloped glazing rated, certified, and labeled per NFRC
	ID: S2/A1.3, T.10-6 default	0.78	118	Non-NFRC atrium sloped glazing, 2 layer, 0.05 emis., fixed

Instructions for Electronic Forms

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

Revised December 2010

Intro	<p>Chapters 11-15 of the 2009 Washington State Energy Code apply to all nonresidential occupancies and to all multifamily residential occupancies except those within the scope of the IRC (single family residential, duplexes, attached townhouses).</p> <p>This file, ENV09.XLS, has electronic compliance forms for Chapter 13 envelop provisions for Climate Zones 1 and 2. There are three companion files: MTR09.XLS (Chapter 12 metering requirements); MECH09.XLS (Chapter 14 mechanical systems requirements); and LTG09.XLS (Chapter 15 lighting, motor, and transformer requirements).</p> <p>This form is a compliance aid and is not a substitute for the full energy code text or specific jurisdiction compliance requirements. In particular, this form is not to be used for cold storage areas. Users should refer to the code text and contact the local jurisdiction for complete information. The full 2009 WSEC code text is available for download from: Download 2009 WSEC from http://www.qa.wa.gov/sbcc</p>
Start-up	<p>Open a working copy of this file and be sure to use Save As to save it to a new file name. Alternatively, you can save the file as a template in the XLSTART subdirectory in the EXCEL directory, and open new copies with the "File New" menu command. Look for "ENV09".</p>
Overview	<p>This workbook file contains multiple worksheets. Each worksheet is indicated by a tab at the bottom of the screen. (If you don't see the tabs, visit menu option "Tools-Options-View-Sheet Tabs".) You may visit each form by clicking on its tab.</p> <p>Most calculations are automated. The spaces which display the results of calculations are not editable. Some adjustments to formatting have been made to facilitate electronic filling and calculation of the forms.</p>
Save Files	<p>Each time you open this file and start filling forms, you must save it under a new filename of your choosing using File Save As. The original template file cannot be altered. You may also save your own versions of the forms this way.</p>
Getting Around	<p>Each form has two pages (front and back). Both pages are available on screen when you click the tab for a form. Use the scroll bars to find the second page. It is either to the right, below, or sometimes to the right and below the first page.</p>
Filling Fields	<p>All project info and the date for all forms is entered once on "ENV-SUM" and automatically reproduced on the other forms. Always fill in the heading of ENV-SUM, even if you will not be using that form. The other forms have a reminder to do this.</p> <p>Only fillable fields are accessible. If you try to edit any other field, you'll get an error message. You may use the TAB key to move to the next fillable field. If the TAB doesn't take you where you want to go, use the mouse.</p> <p>Avoid excessively long text strings when entering information. In some cases, text that extends beyond the available space will simply not be seen. 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 6/8/2006 or 12/21/2012.</p> <p>Check boxes can be either blank, or checked-off with an "x" shown in the box. To toggle between cases, click the box with your mouse. Radio buttons (circles) are either filled or unfilled. Only one in a set may be filled.</p> <p>Drop-down lists have an arrow at the right side of the space. Click the arrow with your mouse and select the appropriate option. One of the options is a blank.</p> <p>When a form has a space for notes or explanation, click anywhere in the space to edit. Your cursor will become a text editing insertion bar and you can edit as with a word processor.</p>
Personalizing	<p>You can personalize the forms with your company name, address, phone, or any other information. This is done by editing the footer using File Page Setup Header/Footer. You can then save the file under a new template name and re-use it again.</p>
Adding Lines and Removing	<p>Many tables, such as for listing equipment types, have a certain number of lines for entering data. There may not always be enough lines for all the entries you need to make. With this electronic version, you can add additional lines to the table.</p> <p>To add additional lines where this feature is available, click on the "+" button with your mouse. This button is located to the right of the sheet. If you can't see it, scroll right (or change the View Zoom setting to 83%).</p> <p>To remove lines that you have added, click on the "-" button with your mouse. You cannot remove lines that were not added; an error appears if you try.</p> <p>If you add additional lines with this method, the pagination will usually be affected. The forms will be forced to carry additional lines over to other pages. Be sure to submit all pages to the plans examiner.</p>
Occupancy Group	<p>You must select a value for Occupancy Group on ENV-SUM (line 14) for this workbook to display the correct code requirements and automatically calculate component performance target UA.</p>
Climate Zone	<p>You must select a value for Climate Zone on ENV-SUM (line 15) for this workbook to display the correct code requirements and automatically calculate component performance target UA.</p>
Fenestration vs Glazing	<p>The 2009 WSEC uses the terms "fenestration" and "glazing" and the terms "overhead glazing" and "skylight" somewhat interchangeably. These forms use fenestration and skylight exclusively. In general, "vertical fenestration" is equivalent to "vertical glazing" and "skylight" is equivalent to "overhead glazing".</p>

Instructions for Electronic Forms

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

Fenestration Area	<p>The Fenestration % shown on the ENV-SUM form is automatically calculated in the electronic version from the Proposed areas on the corresponding ENV-UA form. These calculations follow those in equations 13-1 and 13-2.</p> <p>If you use the Envelope Prescriptive Option, you still must enter the actual areas. As a shortcut in this case, you can enter the vertical fenestration, the skylight and the opaque wall areas (including doors) as single numbers and leave the rest of the ENV-UA form blank.</p>
Fenestration Adjustments	<p>Under the Envelope Component Performance option, the Target Area Adjustment Calculations are fully automatic, using information you enter for on your project type and your Proposed Areas on the ENV-UA form. Target areas are calculated automatically.</p>
Printing	<p>The forms should print on any printer supported by Windows. 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 or flowchart details when printing, you may have a shortage of printer memory. Try printing problem pages individually.</p> <p>By default, only selected forms are printed. To select one or more forms, hold down the Ctrl key and click the tabs of the worksheets you need. Issue the File Print Selected Sheets command. To print the entire set, use File Print Entire Workbook.</p>
Clean Forms	<p>It is possible to print clean, blank versions of these forms for hand filling. To do so, delete all of the heading information at the beginning of ENV-SUM, select the desired Climate Zone and Occupancy Group, and make sure that all fillable cells in the forms are empty. Then print the clean forms.</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>
Partial Form Sets	<p>Forms in a set may not be deleted, because the file is locked, but you need not print all the forms, as explained in "Printing" above.</p>
Re-Calculation	<p>As this is a large file, it may respond slowly to changes if it is set to automatically re-calculate after every action. To set calculation to manual, visit the "Tools-Options-Calculation" menu item. Then manually recalculate using the F9 key.</p>

Interior Lighting Summary

LTG-INT

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

Revised November 2010

Project Info	Project Address	1 - Always fill out this line on PRJ-SUM	Date	2/14/2011
		2 - Fill out this line on PRJ-SUM	For Building Department Use	
		3 - Fill out this line on PRJ-SUM		
	Applicant Name:	4 - Fill out this line on PRJ-SUM		
	Applicant Address:	5 - Fill out this line on PRJ-SUM		
	Applicant Phone:	6 - Fill out this line on PRJ-SUM		

Project Description	<input type="checkbox"/> New Building <input type="checkbox"/> Addition <input type="checkbox"/> Alteration <input type="checkbox"/> Plans Included Refer to WSEC Section 1513 for controls and commissioning requirements.
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Compliance Option	<input type="radio"/> Prescriptive <input type="radio"/> Lighting Power Allowance <input type="radio"/> Systems Analysis (See Qualification Checklist (over). Indicate Prescriptive & LPA spaces clearly on plans.)
--------------------------	--

Alteration Exceptions (check appropriate box - sec. 1132.3)	<input type="checkbox"/> No changes are being made to the lighting and space use not changed <input type="checkbox"/> Less than 60% of the fixtures new, installed wattage not increased, & space use not changed.
---	---

Maximum Allowed Lighting Wattage

Location (floor plan/room #)	Occupancy Description	Allowed Watts per ft ² **	Gross Interior Area in ft ²	Allowed x Area
** From Table 15-1 (over) - document all exceptions on form LTG-LPA			Total Allowed Watts	

Proposed Lighting Wattage

Location (floor plan/room #)	Fixture Description	Number of Fixtures	Watts/ Fixture	Watts Proposed
Total Proposed Watts may not exceed Total Allowed Watts for Interior			Total Proposed Watts	

Notes:

- For proposed Fixture Description, indicate fixture type, lamp type (e.g. T-8), number of lamps in the fixture, and ballast type (if included). For track lighting, list the length of the track (in feet) in addition to the fixture, lamp, and ballast information.
- For proposed Watts/Fixture, use manufacturer's listed maximum input wattage of the fixture (not simply the lamp wattage) and other criteria as specified in Section 1530. For line voltage track lighting, list the greater of actual luminaire wattage or length of track multiplied by 50, or as applicable, the wattage of current limiting devices or of the transformer. For low voltage track lighting list the transformer rated wattage.
- List all fixtures. For exempt lighting, note section and exception number, and leave Watts/Fixture blank.

Interior Lighting Summary (back)

LTG-INT

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

Revised November 2010

Prescriptive Spaces	Occupancy: <input type="radio"/> Warehouse or Parking Garage <input checked="" type="radio"/> Other
Qualification Checklist Note: If occupancy type is "Other" and fixture answer is checked, the number of fixtures in the space is not limited by Code. Clearly indicate these spaces on plans. If not qualified, do LPA Calculations.	Lighting Fixtures: (Section 1521) <input type="checkbox"/> Check if 95% or more of fixtures comply with 1, 2 or 3 and rest are ballasted. 1. Fluorescent fixtures with a) 1 or 2 two lamps, b) reflector or louvers, c) 5-60 watt T-1, T-2, T-4, T-5, T-8, or CFL lamps, and d) hard-wired electronic dimming ballasts. Screw-in CFL fixtures and tracking lighting do not qualify. 2. Metal Halide with a) reflector b) ceramic MH lamps <=150w c) electronic ballasts 3. LED lights.

TABLE 15-1 Unit Lighting Power Allowance (LPA)

Use ¹	LPA ² (W/ft ²)	Use ¹	LPA ² (W/ft ²)
Automotive facility	0.85	Office buildings, office/administrative areas in facilities of other use types (including but not limited to schools, hospitals, institutions, museums, banks, churches) ⁵	0.91
Convention center	1.10	Parking garages	0.20
Courthouse	1.10	Penitentiary and other Group I-3 Occupancies	0.90
Cafeterias, fast food establishments ⁵ , restaurants/bars ⁵	1.20	Police and fire stations	0.90
Dormitory	0.85	Post office	1.00
Dwelling Units	1.00	Retail ¹⁰ , retail banking, mall concourses, wholesale stores (pallet rack shelving)	1.33
Exercise center	0.95	School buildings (Group E Occupancy only), school classrooms, day care centers	1.00
Gymnasias, assembly spaces	0.95	Theater, motion picture	0.97
Health care clinic	1.00	Theater, performing arts	1.25
Hospital, nursing homes, and other Group I-1 and I-2 Occupancies	1.20	Transportation	0.80
Hotel/motel	1.00	Warehouses	0.50
Laboratory spaces (all spaces not classified "laboratory" shall meet office and other appropriate categories)	1.62	Workshops	1.20
Laundries	1.20		
Libraries ⁵	1.20	Plans Submitted for Common Areas Only⁷	
Manufacturing facility	1.20	Main floor building lobbies ³ (except mall concourses)	1.10
Museum	1.00	Common areas, corridors, toilet facilities and washrooms, elevator lobbies	0.80

Footnotes for Table 15-1

- 1) In cases in which a general use and a specific use are listed, the specific use shall apply. In cases in which a use is not mentioned specifically, the Unit Power Allowance shall be determined by the building official. This determination shall be based upon the most comparable use specified in the table. See Section 1512 for exempt areas.
- 2) The watts per square foot may be increased, by 2% per foot of ceiling height above 20 feet, unless specifically directed otherwise by subsequent footnotes.
- 3) Watts per square foot of room may be increased by 2% per foot of ceiling height above 12 feet.
- 4) For all other spaces, such as seating and common areas, use the Unit Light Power Allowance for assembly.
- 5) Watts per square foot of room may be increased by 2% per foot of ceiling height above 9 feet.
- 6) Reserved.
- 7) For conference rooms and offices less than 150ft² with full height partitions, a Unit Lighting Power Allowance of 1.1 w/ft² may be used.
- 8) Reserved.
- 9) For indoor sport tournament courts with adjacent spectator seating over 5,000, the *Unit Lighting Power Allowance* for the court area is 2.60 W/ft².
- 10) Display window illumination installed within 2 feet of the window, provided that the display window is separated from the retail space by walls or at least three-quarter-height partitions (transparent or opaque) and lighting for free-standing display where the lighting moves with the display are exempt.

An additional lighting power allowance is allowed for merchandise display luminaires installed in retail sales areas that are specifically designed and directed to highlight merchandise. The following additional wattages apply:

- i. 0.6 watts per square foot of sales floor area not listed in items ii and iii below;
- ii. 1.4 watts per square foot of furniture, clothing, cosmetics or artwork floor area; or
- iii. 2.5 watts per square foot of jewelry, crystal or china floor area.

The specified floor area for items i, ii, or iii above, and the adjoining circulation paths shall be identified and specified on building plans. Calculate the additional power allowance by multiplying the above LPDs by the sales floor area for each department excluding major circulation paths. The total additional lighting power allowance is the sum of allowances for sales categories i, ii, or iii plus an additional 1,000 watts for each separate tenant larger than 250 square feet in area.

The additional wattage is allowed only if the merchandise display luminaires comply with all of the following:

- (a) Located on ceiling-mounted track or directly on or recessed into the ceiling itself (not on the wall).
- (b) Adjustable in both the horizontal and vertical axes (vertical axis only is acceptable for fluorescent and other fixtures with two points of track attachment).

This additional lighting power is allowed only if the lighting is actually installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose.

This additional lighting power is allowed only if the lighting is actually installed.

- 11) Provided that a floor plan, indicating rack location and height, is submitted, the square footage for a warehouse may be defined, for computing the interior Unit Lighting Power Allowance, as the floor area not covered by racks plus the vertical face area (access side only) of the racks. The height allowance defined in footnote 2 applies only to the floor area not covered by racks.

Exterior Lighting Summary

LTG-EXT

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

Revised November 2010

Project Info	Proj Address: 1 - Always fill out this line on PRJ-SUM	Date	2/14/2011
	2 - Fill out this line on PRJ-SUM	For Building Department Use	
	3 - Fill out this line on PRJ-SUM		
	Name: 4 - Fill out this line on PRJ-SUM		
	Appl. Name 5 - Fill out this line on PRJ-SUM		
	Appl. Phone 6 - Fill out this line on PRJ-SUM		

Project Description	<input type="checkbox"/> New <input type="checkbox"/> Addition <input type="checkbox"/> Alteration <input type="checkbox"/> Plans Included Refer to WSEC Section 1513 for controls and commissioning requirements.
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Lighting Zone (as specified by Jurisdiction)	<input type="radio"/> Zone 1 <input type="radio"/> Zone 2 <input type="radio"/> Zone 3 <input type="radio"/> Zone 4
--	---

Compliance Option	<input type="radio"/> Lighting Power Allowance <input type="radio"/> Systems Analysis
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Building Grounds (luminaires > 100 Watts)	<input type="checkbox"/> Efficacy > 60 lumens/W <input type="checkbox"/> Controlled by motion sensor <input type="checkbox"/> Exemption (list) _____
---	---

Alteration Exceptions (check appropriate box - sec. 1132.3)	<input type="checkbox"/> No changes are being made to the lighting and space use not changed. <input type="checkbox"/> Less than 60% of fixtures are new, installed wattage not increased, & space use not changed.
---	--

Tradable Maximum Allowed Lighting Wattage				Base Site Allowance:	
Tradable Surfaces	Description	Allowed Watts per ft ² or per lf	Area (ft ² , perimeter (lf) or # of items)	Allowed Watts x ft ² (or x lf)	
Total Allowed Tradable Watts:					

Tradable Proposed Lighting Wattage (use mfg listed maximum input wattage for luminaire.)				
Surface	Fixture Description	Number of Fixtures	Watts/ Fixture	Watts Proposed
Total Proposed Tradable Watts:				

Total proposed tradable watts may not exceed the sum of total allowed tradable watts plus the base site allowance. Any base site allowance not needed to make tradable watts comply can be applied to individual non-tradable categories.

Non-Tradable Maximum Allowed Lighting Wattage				Base Site Allowance Remaining:	
Non-Tradable Surfaces	Description	Allowed Watts per ft ² or per lf	Area (ft ² , perimeter (lf) or # of items)	Allowed Watts x ft ² (or x lf)	

Non-Tradable Proposed Lighting Wattage				
Surface	Fixture Description	Number of Fixtures	Watts/ Fixture	Watts Proposed

Non-tradable proposed watts may not exceed allowed watts for any individual surface unless the total excess watts for all non-tradable surfaces are less than the remaining site allowance.

Total excess Non-Tradable watts: _____
Site Allowance Balance: _____

Exterior Lighting Summary (back)**LTG-EXT**

**TABLE 15-2B
LIGHTING POWER DENSITIES FOR BUILDING EXTERIORS**

Specific area description		Zone 1	Zone 2	Zone 3	Zone 4
Base site allowance¹		500 W	600 W	750 W	1300 W
Tradable Surfaces²					
Uncovered Parking Areas	Parking lots and drives	0.04 W/ft ²	0.06 W/ft ²	0.10 W/ft ²	0.13 W/ft ²
Building Grounds	Walkways less than 10 ft wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
	Walkways 10 ft wide or greater Plaza areas Special feature areas	0.14 W/ft ²	0.14 W/ft ²	0.16 W/ft ²	0.2 W/ft ²
	Exterior Stairways	0.75 W/ft ²	1.0 W/ft ²	1.0 W/ft ²	1.0 W/ft ²
	Pedestrian tunnel	0.15 W/ft ²	0.15 W/ft ²	0.2 W/ft ²	0.3 W/ft ²
	Landscaping	0.04 W/ft ²	0.05 W/ft ²	0.05 W/ft ²	0.05 W/ft ²
Building Entrances and Exits	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width	30 W/linear foot of door width
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width
	Entry canopies	0.25 W/ft ²	0.25 W/ft ²	0.4 W/ft ²	0.4 W/ft ²
Sales Canopies	Free standing and attached	0.6 W/ft ²	0.6 W/ft ²	0.8 W/ft ²	1.0 W/ft ²
Outdoor Sales	Open areas ³	0.25 W/ft ²	0.25 W/ft ²	0.5 W/ft ²	0.7 W/ft ²
	Street frontage for vehicle sales lots in addition to "open area" allowance	No Allowance	10 W/linear foot	10 W/linear foot	30 W/linear foot
Non-Tradable Surfaces⁴					
Building Facades		No Allowance	0.1 W/ft ² for each illuminated wall or surface ⁵	0.15 W/ft ² for each illuminated wall or surface ⁶	0.2 W/ft ² for each illuminated wall or surface ⁷
Automated teller machines and night depositories		270 W per location ⁸	270 W per location ⁸	270 W per location ⁸	270 W per location ⁸
Entrances and gatehouse inspection stations at guarded facilities		0.75 W/ft ² of covered & uncovered area			
Loading areas for law enforcement, fire, ambulance and other emergency service vehicles		0.5 W/ft ² of covered & uncovered area			
Material handling and associated storage		No Allowance	No Allowance	No Allowance	0.5 W/ft ²
Drive-up Windows & Doors		400W per drive-through			
Parking near 24-hour retail entrances		800 W per main entry			

FOOTNOTES FOR TABLE 15-2B:

- Base site allowance may be used in tradable or nontradable surfaces.
- Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be traded.
- Including vehicle sales lots.
- Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.
 - May alternately use 2.5 watts per linear foot for each wall or surface length.
 - May alternately use 3.75 watts per linear foot for each wall or surface length.
 - May alternately use 5 watts per linear foot for each wall or surface length.
 - An additional 90 watts is allowed per additional ATM location.

Lighting, Motor, and Transformer Permit Plans Checklist LTG-CHK

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential

Revised November 2010

Project Address	1 - Always fill out this line on PRJ-SUM	Date	2/14/2011
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The following information is necessary to check a permit application for compliance with the lighting, motor, and transformer requirements in the 2009 Washington State Nonresidential Energy Code.

Applicability (yes, no, n.a.)	Code Section	Component	Information Required	Location on Plans	Building Department Notes
LIGHTING CONTROLS (Section 1513)					
	1513.1	Local control/access	Schedule with type, indicate locations		
	1513.2	Area controls	Maximum limit per switch		
	1513.3	Daylight zone control	Schedule with type and features, indicate locations		
		vertical glazing	Indicate vertical glazing on plans		
		overhead glazing	Indicate overhead glazing on plans		
	1513.4	Display/exhib/special	Indicate separate controls		
	1513.5	Exterior shut-off	Schedule with type and features, indicate location		
		(a) timer w/backup	Indicate location		
		(b) photocell.	Indicate location		
	1513.6	Inter. auto shut-off	Indicate location		
	1513.6.1	(a) occup. sensors	Schedule with type and locations		
	1513.6.2	(b) auto. switches	Schedule with type and features (back-up, override capability); indicate size of zone on plans		
	1513.7	Hotel/motel controls	Indicate location of room master controls		
	1513.8	Commissioning	Indicate requirements for lighting controls commissioning		
EXIT SIGNS (Section 1514)					
	1514	Max. watts	Indicate watts for each exit sign		
LIGHTING POWER ALLOWANCE (Section 1530-1532)					
	1531	Interior Lighting Summary Form	Completed and attached. Schedule with fixture types, lamps, ballasts, watts per fixture		
	1532	Exterior Lighting Summary Form	Completed and attached. Schedule with fixture types, lamps, ballasts, watts per fixture		
MOTORS (Section 1511)					
	1511	Elec motor efficiency	MECH-MOT or Equipment Schedule with hp, rpm, efficiency		
TRANSFORMERS (Section 1540)					
	1540	Transformers	Indicate size and efficiency		

If "no" is circled for any question, provide explanation: