2009 Washington State Non-Residential Energy Code

Stan Price, Northwest Energy Efficiency Council

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2009 WSEC Adoption

The 2009 WSEC went into effect January 1, 2011.

General Comments

- This presentation does not list or reflect all changes in the 2009 Washington State Energy Code.
- Code sections as presented may have portions excluded for clarity during presentation.
- The code sections presented are intended to highlight select code revisions only.
- It is recommended to go to the State Building Code Council website to download the new code in order to reference the entire detail.

www.ga.wa.gov/sbcc

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ADMINISTRATION AND ENFORCEMENT

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Interpretation of the Code

- Technical code support is provided to the industry by NEEC (Non-Residential) and WSU Extension Energy Program (Residential).
- This support is funded by the Northwest Energy Efficiency Alliance (NEEA).
- “Official” interpretations of Energy Code content are made only by the SBCC in response to questions submitted by building officials.
- Official interpretations are available at the SBCC website.

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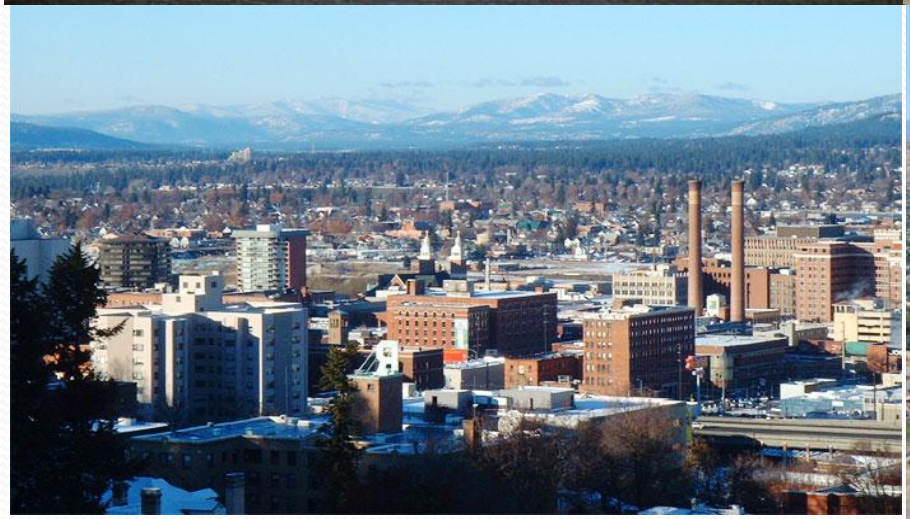


Photo by Dean Johnson

Enforcement of the Code

- The WSEC is the Code for the entire State of Washington, except Seattle (SEC).
- Code enforcement is the responsibility of the local jurisdiction.
- It is recommended to consult the local building official when dealing with a Code intent or compliance related question. Facilitates a smooth permit review process.

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NREC Multi-Family Residential

- One- and Two-Family Dwellings are to comply with Chapters 1 - 10.
- **All other multifamily projects** are to comply with Chapters 11 – 20.
- Chapter 2, 7 and 10 are applicable to all building types.

- IRC R101.2 Single Family Residential
  - …"detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress".

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NREC Multi-Family Residential

- Chapter 2 Definitions - Multifamily Residential
  i. All Group R Occupancy not falling under the scope of IRC 101.2 including, but not limited to, dwelling units, hotel/motel guest rooms, dormitories, fraternity/sorority houses, hostels, prisons, and fire stations;
  ii. All sleeping areas in Group I Occupancy including, but not limited to, assisted living facilities, nursing homes, patient rooms in hospitals, prisons, and fire stations; and
  iii. All sleeping areas in other occupancies including, but not limited to, fire stations.
  - 1120 Scope
- This Code sets forth minimum requirements for the design and commissioning of new or altered buildings …for public assembly, educational, business, mercantile, institutional, storage, factory, industrial, **and multifamily residential** occupancies ….

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Chapter 11

Remodels, Renovations, Additions

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Additions

Section 1131 Additions to Existing Buildings

Additions to existing buildings or structures may be constructed without making the entire building or structure comply, provided that the new additions shall conform to the provisions of this Code.

Exception: floor areas 750 sf or less that do not fully comply may be approved if improvements to the existing building are made to compensate. <u>These additions are also exempt from Section 1314.6</u> (new)

Section 1314.6 requires air leakage pressurization testing for buildings over 5 stories.

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Economizers - System Alterations

- 1132.2 Mechanical Systems
  - *Comment: Additional detail has been provided that is specifically related to mechanical system additions and alternations.*
  - Additions or alterations shall not be made to an existing mechanical system that will cause the existing mechanical system to become out of compliance.
  - When space cooling equipment is replaced, controls shall be installed to provide for integrated operation with economizer in accordance with Section 1413.3.
  - "Table 11-1: Economizer Compliance Options for Mechanical Alterations" has not changed.

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Table 11-1 Economizer Compliance Options for Mechanical Alterations

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	**Any alteration with new or replacement equipment**	**Replacement unit of the same type with the same or smaller output capacity**	**Replacement unit of the same type with a larger output capacity**	**New equipment added to existing system or replacement unit of a different type**
1. Packaged Units	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: min.[1] Economizer: 1433[2,3]	Efficiency: min.[1] Economizer: 1433[2,3]	Efficiency: min.[1] Economizer: 1433[2,4]
2. Split Systems	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: + 10/5%[5] Economizer: shall not decrease existing economizer capability	Only for new units < 54,000 Btuh replacing unit installed prior to 1991 (one of two): Efficiency: + 10/5%[5] Economizer: 50%[6] For units > 54,000 Btuh or any units installed after 1991: Option A	Efficiency: min.[1] Economizer: 1433[2,4]
3. Water Source Heat Pump	Efficiency: min.[1] Economizer: 1433[2]	(two of three): Efficiency: + 10/5%[5] Flow control valve[7] Economizer: 50%[6]	(three of three): Efficiency: + 10/5%[5] Flow control valve[7] Economizer: 50%[6] (except for certain pre-1991 systems[8])	Efficiency: min.[1] Economizer: 1433[2,4] (except for certain pre-1991 systems[8])
4. Hydronic Economizer using Air-Cooled Heat Rejection Equipment (Dry Cooler)	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: + 10/5%[5] Economizer: shall not decrease existing economizer capacity	Option A	Efficiency: min.[1] Economizer: 1433[2,4]
5. Air-Handling Unit (including fan coil units) where the system has an air-cooled chiller	Efficiency: min.[1] Economizer: 1433[2]	Economizer: shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems[8])	Option A (except for certain pre-1991 systems[8])
6. Air- Handling Unit (including fan coil units) and Water-cooled Process Equipment, where the system has a water-cooled chiller[10]	Efficiency: min.[1] Economizer: 1433[2]	Economizer: shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems[8] and certain 1991-2004 systems[9].)	Efficiency: min.[1] Economizer: 1433[2,4] (except for certain pre-1991 systems[8] and certain 1991-2004 systems[9])
7. Cooling Tower	Efficiency: min.[1] Economizer: 1433[2]	No requirements	Option A	Option A
8. Air-Cooled Chiller	Efficiency: min.[1] Economizer: 1433[2]	Efficiency: + 5%[11] Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 10%[12] and (2) multistage Economizer: shall not decrease existing economizer capacity	Efficiency: min.[1] Economizer: 1433[2,4]
9. Water-Cooled Chiller	Efficiency: min.1 Economizer: 14332	Efficiency (one of two): (1) + 10%13or (2) plate frame heat exchanger15 Economizer: shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 15%14 and (2) plate-frame heat exchanger15 Economizer: shall not decrease existing economizer capacity	Efficiency: min.1 Economizer: 14332,4
10. Boiler	Efficiency: min.1 Economizer: 14332	Efficiency: + 8%16 Economizer: shall not decrease existing economizer capacity	Efficiency: + 8%16 Economizer: shall not decrease existing economizer capacity	Efficiency: min.1 Economizer: 14332,4

Commissioning

- 1135 Commissioning (New)
  - Commissioning in compliance with Sections 1416 and 1513.8 shall be required for new systems **or modified portions of systems**, with a heating capacity of 600,000 Btu/h or a cooling capacity of 40 tons or more.
  - *Comment: Commissioning requirements for existing systems are now required.*
- 1141.5 Commissioning Details/Specifications (New)
  - **When required by the building official**, include a list of the functional tests required to comply with commissioning in accordance with Sections 1416 and 1513.8 (mechanical and electrical commissioning requirements) as well as the name of the commissioning agent for buildings over 50,000 square feet.
  - *Comment: This applies only "when required by the building official."*

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Lighting and Motors

Section 1132.3 Lighting and Motors

- Code section has not changed in 2009, but when triggered, new requirements are in place

- Tenant improvement or alteration where 60% of more of lighting fixtures in a space are new, then LPA requirements in Section 1531 must be met.

- When new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, lighting controls requirements in Sections 1513.1 through 1513.5 (and 1513.8 if applicable) must be met.

- New walls or ceiling height partitions are added to an existing space, the new enclosed space shall comply with controls requirements in Section 1513.

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Lighting Panels

Section 1132.2

Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall also comply with the other requirements in Sections 1513.6 through 1513.8.

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Lighting Controls

Section 1513.1 Lighting Control and Accessibility
Section 1513.2 Area Controls
Section 1513.3 Daylight Zone Control
Section 1513.6 Automatic Shut-off Controls, Interior

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BUILDING ENVELOPE

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Infiltration (Air Leakage)

- This section of the Code has been substantially changed and expanded.
- Infiltration is defined as uncontrolled air movement through the building envelope. Represents a major component of building heat loss.
- This topic was generally neglected in previous codes.

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Air Leakage

- 1314.1 Building Envelope Sealing (Revised)
  - The following areas of the envelope shall be sealed, caulked, gasketed, or weather-stripped to minimize air leakage:
    - Joints around fenestration and door frames;
    - Junctions between walls and foundations, between walls at building corners, between walls and structural floors or roofs, and between walls and roof or roof panels;
    - Openings at penetrations of utility services through the roofs, walls, and floors;
    - Site-built fenestration and doors;
    - Building assemblies used as ducts or plenums;
    - Joints, seams, and penetrations of vapor retarders;
    - All other openings in the building envelope.

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Air Leakage

- 1314.2 Glazing and Doors (Revised)
  - Air leakage (rating) for fenestration and doors shall be determined by a laboratory accredited by a nationally recognized accreditation organization, such as the National Fenestration Rating Council (in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 or ASTM E283), and shall be labeled and certified by the manufacturer.
  - Air leakage shall be tested at a pressure of at least 1.57 lbs per SF and shall not exceed:
    - 1.0 cfm per SF for glazed swinging entrance doors and revolving doors
    - 0.04 cfm per SF for curtain wall and storefront glazing
    - 0.2 cfm per SF for all other products, or 0.3 cfm per SF when tested at a pressure of at least 6.24 lbs per SF.

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Air Leakage

- 1314.5 Loading Dock Weatherseals (New)
  - Cargo doors and loading dock doors shall be equipped with weatherseals to restrict infiltration when vehicles are parked in the doorway.

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Air Leakage

- 1314.6 Continuous Air Barrier (New)
  - For buildings over five stories, the building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of, the conditioned space.
  - All air barrier components of each envelope assembly shall be clearly identified on construction documents and the joints, interconnections and penetrations of the air barrier components shall be detailed.

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Air Leakage

- 1314.6.2 Compliance (New)
  - The continuous air barrier for the opaque building envelope shall be demonstrated by testing the completed building and demonstrating that the air leakage rate of the building envelope does not exceed **0.40 cfm/SF** at a pressure differential of 0.3 inch w.g. (1.57 psf).
  - Tests shall be accomplished using either pressurization or depressurization or both.
  - Whole building testing shall be accomplished in accordance with ASTM E 779 or approved similar test.
  - Under ASTM E 779 it is permissible to test using the building HVAC system.

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Air Leakage

- 1314.6.2 Compliance (New)
  - In lieu of the fan pressurization method described in ASTM E 779, a tracer gas test of the building air change rate in accordance with ASTM E 741 is also allowed. The tracer gas test shall be run with building HVAC fans off.
  - The approved compliance test procedure for a multi-zone building is described in the Code.
- 1314.6.3 Certificate of Occupancy (New)
  - **A final certificate of occupancy shall not be issued for the building, or portion thereof, until such time that the building official determines the building, or portion thereof, has been field tested in accordance with Section 1314.6.2.**

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Air Leakage

- Additional Resources
  - U.S. Army Corp Buildings Air Barrier Testing Guide
    - Includes Air Tightness Test Form
    - Army Goal – Accurate measurement of leakage rate in CFM/SF of exterior envelope area at 75 pa. Army Corp's established criteria is **0.25 CFM/SF** at 75 pa.
  - Air Barrier Association of America
    - www.airbarrier.org

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Building Envelope

- Requirements are specified separately for two space types and two climate zones:
  - Nonresidential
  - Residential other than Single Family, i.e. Multi-family
  - **No longer divided by "electric resistance heat" and "all others including heat pumps and VAV."**
  - Zone 1 (generally west of Cascades) and Zone 2 (east of the Cascades).

- 1310.3 Cold Storage and Refrigerated Spaces (New section)
  - New Table 13-3 Refrigerated Warehouse Insulation

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Climate Zones

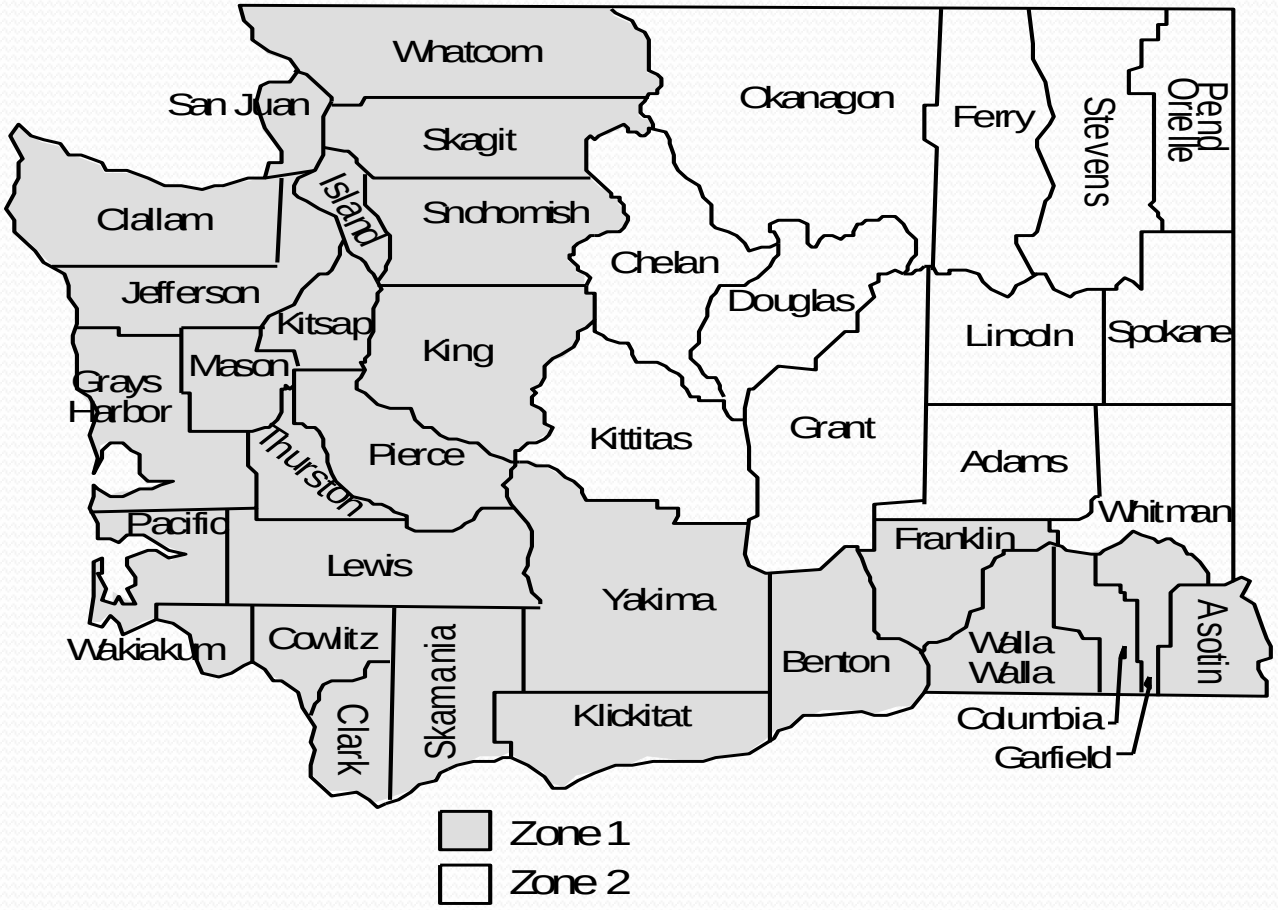

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Table 13-1 Building Envelope Requirements - ***Climate Zone 1***

	Nonresidential		Residential, Other than Single-Family	
Opaque Elements	**Assembly Max.**	**Insulation Min. R-Value**	**Assembly Max.**	**Insulation Min. R-Value**
Floors				
Mass	U-0.029	R-30 c.i.	U-0.029	R-30 c.i.
Steel Joist	U-0.029	R-38 + R-4 c.i.	U-0.029	R-38 + R-4 c.i.
Wood Framed and Other	U-0.029	R-30	U-0.029	R-30
Slab-On-Grade Floors				
Unheated	F-0.540	R-10 for 24 in. (with thermal break)	F-0.540	R-10 for 24 in. (with thermal break)
Heated	F-0.360	R-10 c.i.(with thermal break)	F-0.360	R-10 c.i. (with thermal break)
Opaque Doors				
Swinging and non-swinging	U-0.600		U-0.400	

Comment: Mixed-use facilities will have to show compliance under Nonresidential for retail areas and Residential for dwelling areas. May require filling out two NREC forms, particularly if complying under Component Performance.

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NREC COMPLIANCE FORMS

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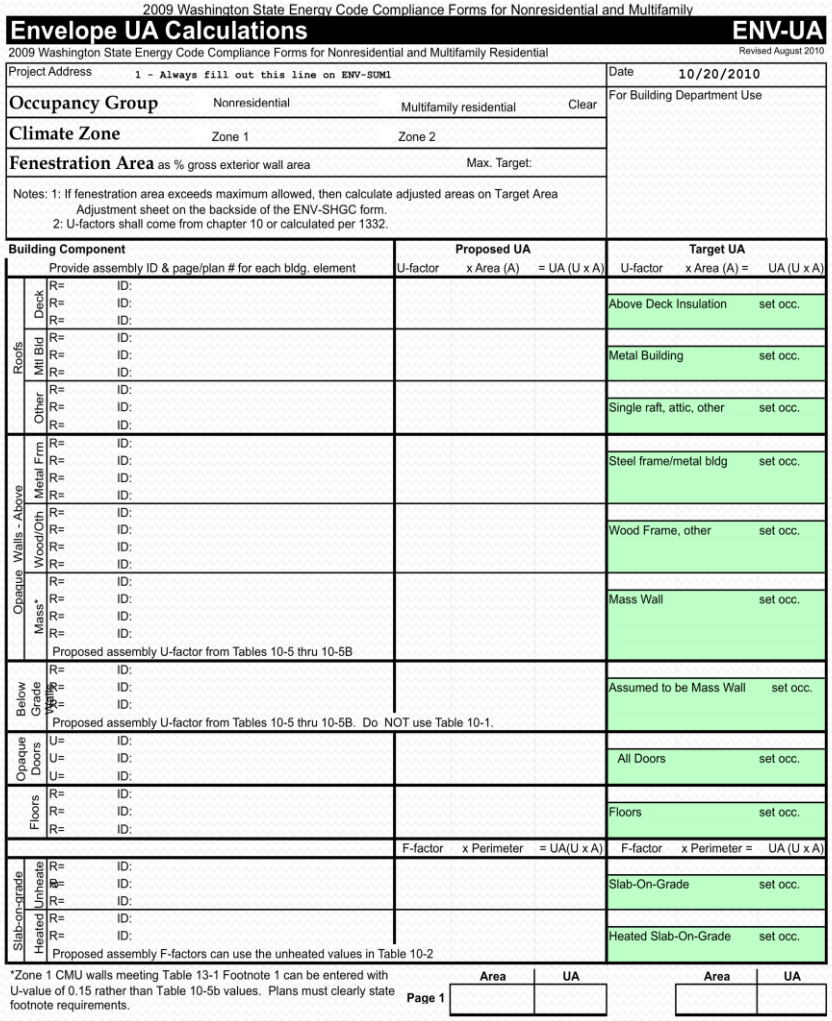
NREC Forms

- Envelope UA Calculations (ENV-UA)
  - Zone 1 Non-Residential
  - Zone 1 Residential
  - Zone 2 Non-Residential
  - Zone 2 Residential
  - Cold and Refrigerated Storage
- SHGC Calculations (ENV-SHGC)
- Target Area Adjustment Calculations
- Building Permit Plans Checklist (ENV-CHK)



2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily

Envelope UA Calculations **ENV-UA**

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

Project Address: 1 - Always fill out this line on ENV-SUM1 | Date: 10/20/2010 | For Building Department Use

Occupancy Group — Nonresidential | Multifamily residential | Clear

Climate Zone — Zone 1 | 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.

Building Component	Provide assembly ID & page/plan # for each bldg. element	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= ID:						
	R= ID:				Above Deck Insulation		set occ.
	R= ID:						
Roofs – Mtl Bld	R= ID:						
	R= ID:				Metal Building		set occ.
	R= ID:						
Roofs – 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:						
	R= ID:						
Opaque Walls - Above – Wood/Oth	R= ID:						
	R= ID:				Wood Frame, other		set occ.
	R= ID:						
	R= ID:						
Opaque Walls - Above – Mass*	R= ID:						
	R= ID:				Mass Wall		set occ.
	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:						
	U= ID:				All Doors		set occ.
	U= ID:						
Floors	R= ID:						
	R= ID:				Floors		set occ.
	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:						
Slab-on-grade 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.

Page 1 — Area | UA | Area | UA

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LIGHTING SYSTEMS

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Daylight Zone

- 201 General Definitions – Under overhead glazing
  - The area under overhead glazing whose horizontal dimension, in each direction, is equal to the overhead glazing dimension in that direction plus either ***70 percent*** of the floor to ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent overhead or vertical glazing, whichever is least.

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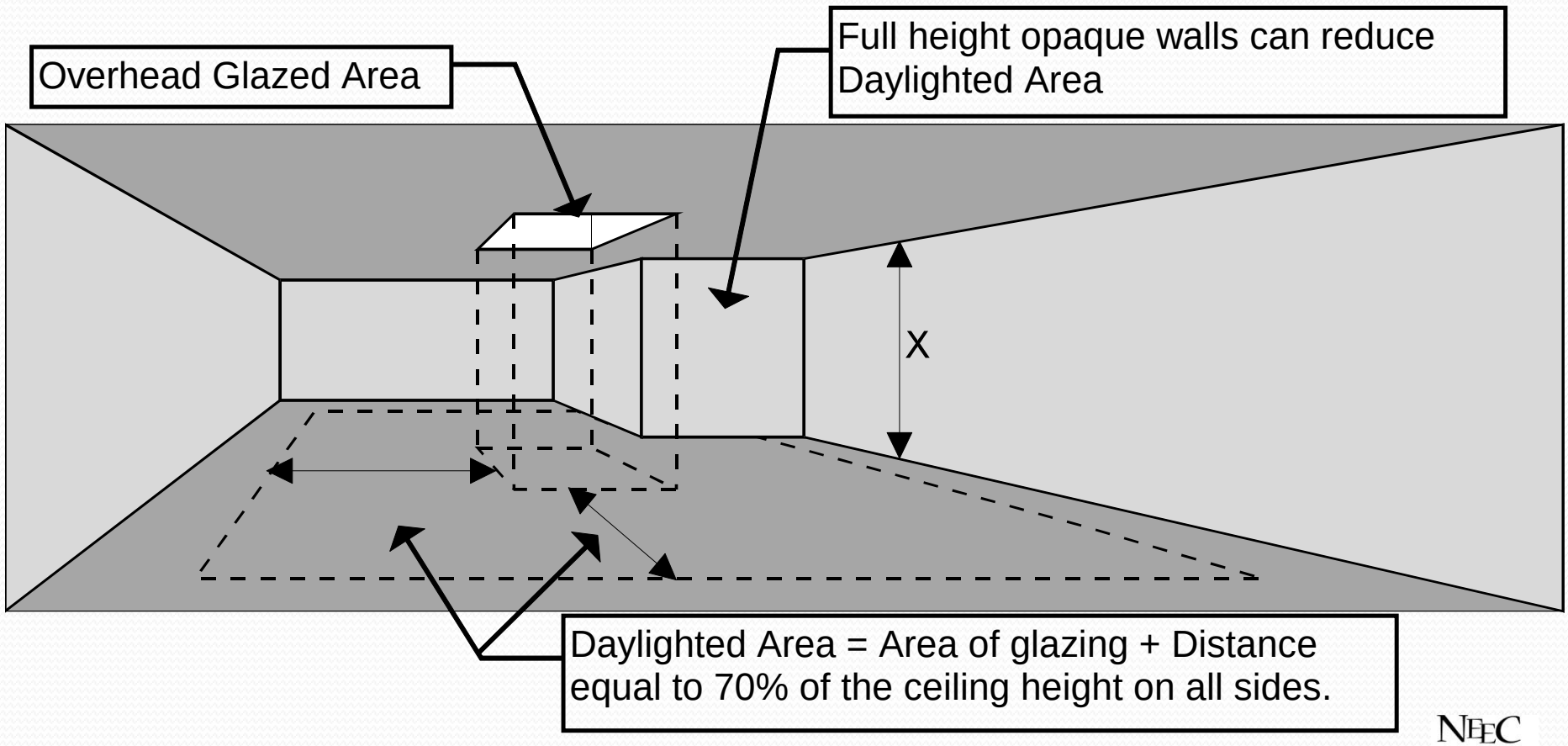
Daylight Zone - Overhead Glazing



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Daylight Zone

- 201 General Definitions – At vertical glazing
  - Primary daylighted zone depth - Extends into the space a distance equal to the window head height.
  - Secondary daylighted zone depth - Extends from the edge of the primary zone to a distance equal to two times the window head height, or to the nearest ceiling height opaque partition, whichever is less.
  - Daylighting zone width - The width of the window plus either two feet on each side (the distance to an opaque partition) or one-half the distance to adjacent overhead or vertical glazing, whichever is least.

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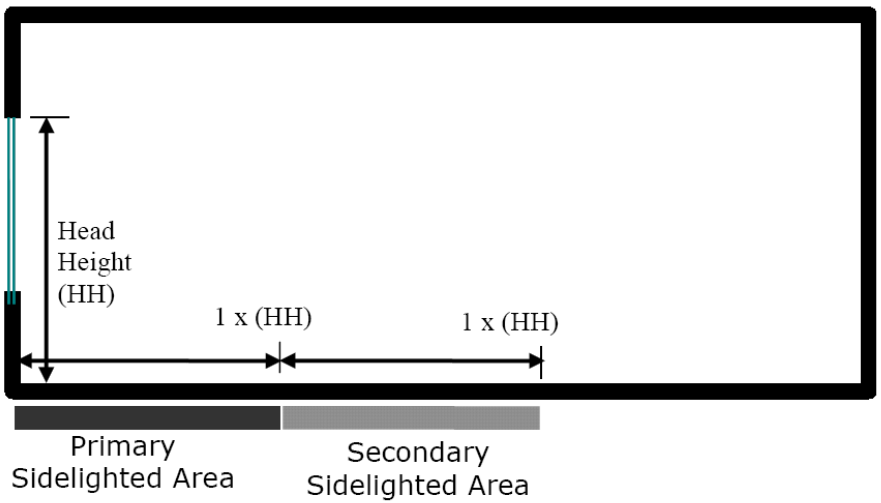
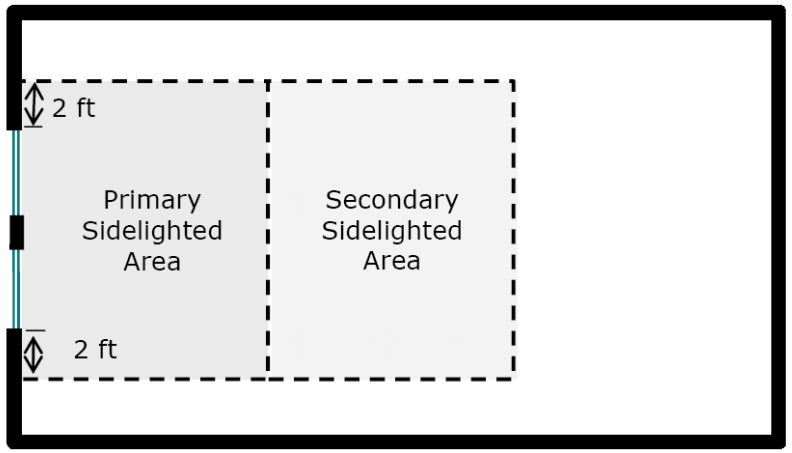
Daylight Zone – Vertical Glazing

a) Section View



b) Plan View



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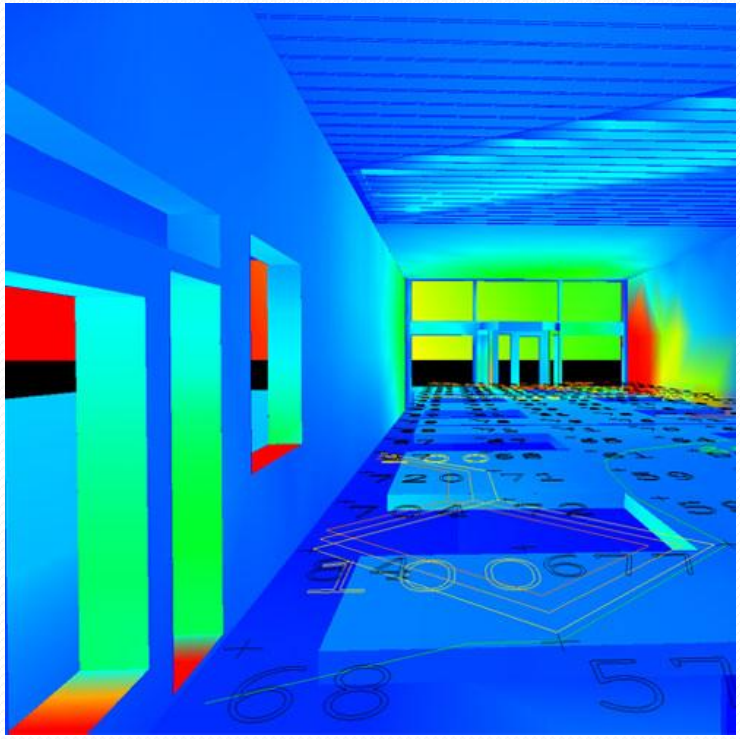
Daylighting Controls

- 1513.3 Daylight Zone Control
  - Automatic daylight sensing controls are required in all areas with skylights, monitors or other fenestration at or above ceiling level and in all areas with windows.
  - Primary and secondary daylight zones shall be controlled separately.



Daylighting Analysis
Integrated Design Lab - Bozeman

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Daylighting Controls

- 1513.3 Daylight Zone Control
  - Daylight sensing controls shall:
    - Reduce the light output of the controlled luminaires while maintaining a uniform level of illuminance.
    - Have time-delay circuits to prevent cycling of light level changes.
    - Only control daylight area fixtures.

Daylighting Analysis
Integrated Design Lab - Bozeman

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Daylighting Controls

- 1513.3 Daylight Zone Control
  - Light output control may be accomplished by:
    - Continuous dimming to at least 20% light output.
    - Step switching of each lamp in individual luminaires.
    - Step dimming by reducing the output of all of the lamps in individual luminaires by at least 50%.
- 1513.3 Daylight Zone Control Exemptions
  - Exempt from requirement for automatic daylighting control:
    - Retail spaces adjacent to vertical glazing (retail spaces under overhead glazing are not exempt).
    - Display, exhibition and specialty lighting that are controlled independently of general area lighting. (Section 1513.4)

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Daylighting Controls

- 1513.3 Daylight Zone Control Exemptions
  - Exempt from requirement for automatic daylighting control provided they have occupancy sensor controls:
    - Small spaces in the daylighted zone that are normally unoccupied (such as a storage room or restroom with a window).
    - Rooms less than 300 square feet.
    - Conference rooms 300 square feet and larger that have a lighting control system with at least four scene options and occupancy sensor control.
    - HID lamps with automatic controls that are capable of reducing the power consumption by at least 50%.
    - HID lamps 100 watts or less.

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Lighting Controls

- 1513.6 Automatic Shut-off Controls, Interior
  - All buildings shall be equipped with separate automatic controls to shut off the lighting in all spaces during unoccupied hours.
  - Occupancy sensors are required in:
    - Office areas less than 300 square feet enclosed by walls or ceiling-height partitions
    - Meeting and conference rooms
    - School classrooms
    - Warehouse and storage spaces (new)
    - For other spaces, automatic controls may be an occupancy sensor, time switch, or other device capable of automatically shutting off lighting.

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Lighting Controls

- 1513.6 Automatic Shut-off Controls, Interior
  - Exceptions to the requirements of this section:
    - Areas that must be continuously illuminated or illuminated in a manner requiring manual operation of the lighting (such as 24-hour operation facilities).
    - Emergency lighting and means of egress illumination as required by code that are normally OFF during normal building operation. (New)
    - Switching for industrial or manufacturing process facilities as may be required for production.
    - 24-hour occupancy areas in hospitals and laboratory spaces. (New)
    - Areas in which medical or dental tasks are performed.
    - Dwelling units (New)

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Lighting Power

- 1520 & 1530 Lighting Wattage
  - There are two methods of identifying the maximum allowable lighting wattage:
    - Section 1520 – Prescriptive Lighting Option
      - There are no 2009 changes to this section of the code.
    - Section 1530 – Lighting Power Allowance Option
      - 1531 – Interior Lighting Power Allowance
      - 1532 – Exterior Lighting Power Allowance
      - 2009 changes in both sections.

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Table 15-1 Unit Lighting Power Allowance (LPA)

TABLE 15-1
Unit Lighting Power Allowance (LPA)

Use[1]	LPA[2] (watts/sq. ft.)
Automotive facility	((~~0.9~~)) 0.85
Convention center	((~~1.2~~)) 1.10
Court house	((~~1.2~~)) 1.10
Cafeterias, fast food establishments[5], restaurants/bars[5]	((~~1.3~~)) 1.20
Dormitory	((~~1.0~~)) 0.85
Dwelling units	1.00
Exercise center	((~~1.0~~)) 0.95
Gymnasia((~~[3]~~)), assembly spaces((~~[3]~~))	((~~1.0~~)) 0.95
Health care clinic	((~~1.0~~)) 1.00
Hospital, nursing homes, and other Group I-1 and I-2 Occupancies	((~~1.2~~)) 1.20
Hotel/motel	((~~1.0~~)) 1.00
((~~Hotel banquet/conference/exhibition hall[3,4]~~	~~2.0~~))
Laboratory spaces (all spaces not classified "laboratory" shall meet office and other appropriate categories)	((~~1.8~~)) 1.62
Laundries	((~~1.2~~)) 1.20
Libraries[5]	((~~1.3~~)) 1.20
Manufacturing facility	((~~1.3~~)) 1.20
Museum	((~~1.1~~)) 1.00

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Table 15-1 Unit Lighting Power Allowance (LPA)

Use[1]	LPA[2] (watts/sq. ft.)
Office buildings, office/administrative areas in facilities of other use types (including but not limited to schools, hospitals, institutions, museums, banks, churches)[5((,7,11))]	((~~1.0~~)) 0.91
Parking garages	((~~0.2~~)) 0.20
Penitentiary and other Group I-3 Occupancies	((~~1.0~~)) 0.90
Police and fire stations((~~8~~))	((~~1.0~~)) 0.90
Post office	((~~1.1~~)) 1.00
Retail[10], retail banking, mall concourses, wholesale stores (pallet rack shelving)	((~~1.5~~)) 1.33
School buildings (Group E Occupancy only), school classrooms, day care centers	((~~1.2~~)) 1.00
Theater, motion picture	((~~1.2~~)) 0.97
Theater, performing arts	((~~1.6~~)) 1.25
Transportation	((~~1.0~~)) 0.80
Warehouses((~~11, storage areas~~))	((~~0.5~~)) 0.50
Workshop	((~~1.4~~)) 1.20
Plans Submitted for Common Areas Only[7]	
Main floor building lobbies[3] (except mall concourses)	((~~1.2~~)) 1.10
All building common areas, corridors, toilet facilities and washrooms, elevator lobbies, including Group R-1 and R-2 Occupancies	((~~0.8~~)) 0.80

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Lighting Power

- 1532 Exterior Lighting Power Allowance
  - The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are designated on the buildings plans to be illuminated and are permitted in Table 15-2B for the applicable lighting zone.
  - Trade-offs are allowed only among exterior lighting applications listed in the Table 15-2B "Tradable Surfaces" section.
  - The lighting zone for building exterior is determined from Table 15-2A unless otherwise specified by the local jurisdiction.

LIGHTING SYSTEMS
NREC COMPLIANCE FORMS

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NREC Forms

- Interior Lighting Summary (LTG-INT)
- Lighting Power Allowance Adjustments (LTG-LPA)
- Exterior Lighting Summary (LTG-EXT)
- Lighting, Motor and Transformer Permit Plans Checklist (LTG-CHK)

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Exterior Lighting Summary

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Project Info	Proj Address 1 - Always fill out this line on PRJ-SUM	Date
	2 - Fill out this line on PRJ-SUM	For Building Departme
	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	New	Addition	Alteration	Plans Included
	Refer to WSEC Section 1513 for controls and commissioning requirements.			
Lighting Zone (as specified by Jurisdiction)	Zone 1	Zone 2	Zone 3	Zone 4
Compliance Option	Lighting Power Allowance	Systems Analysis		
Building Grounds (luminaires > 100 Watts)	Efficacy > 60 lumens/W	Controlled by motion sensor		
	Exemption (list)			
Alteration Exceptions (check appropriate box - sec. 1132.3)	No changes are being made to the lighting and space use not changed.			
	Less than 60% of fixtures are new, installed wattage not increased, & space use no			

Tradable Maximum Allowed Lighting Wattage — Base Site Allowance:

Tradable Surfaces	Description	Allowed Watts per ft² or per lf	Area (ft²), perimeter (lf) or # of items

Total Allowed Tradable Watts:

Tradable Proposed Lighting Wattage (use mfgr listed maximum input wattage for luminaire.)

Surface	Fixture Description	Number of Fixtures	Watts/ Fixture

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.

Total Proposed Tradable Watts:

Non-Tradable Maximum Allowed Lighting Wattage — Base Site Allowance Remaining:

Non-Tradable Surfaces	Description	Allowed Watts per ft² or per lf	Area (ft²), perimeter (lf) or # of items

Non-Tradable Proposed Lighting Wattage

Surface	Fixture Description	Number of Fixtures	Watts/ Fixture

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:

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ENERGY METERING

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Energy Metering - Chapter 12

- Whole building energy supply sources and various energy consuming components shall be metered to provide energy consumption data to the building owner. This new requirement provides the means to effectively monitor and manage building energy consumption and diagnose potential issues.

- Metering is defined as having the ability to collect overall totalized energy use data.
  - Small buildings with a single electric meter would comply under this definition.
  - For larger buildings with separate meters for various tenants, a means of collecting the energy use of all building meters would be required.

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Whole Building Energy Supply Metering

TABLE 12-1
ENERGY SOURCE METER THRESHOLDS

Energy Source	Main Metering Threshold
Electrical service	> 500 kVA
On-site renewable electric power	> 10 kVA (peak)
Gas and steam service	> 300 kW (1,000,000 Btu/h)
Geothermal	> 300 kW (1,000,000 Btu/h) heating
On-site renewable thermal energy	> 10 kW (30,000 Btu/h)

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Energy Source Metering

- 1202 Whole Building Energy Supply Metering – Source Metering
  - For energy sources listed in Table 12-1, whole building energy supply meters with remote metering capability or automatic meter reading capability (AMR) are required.
  - Utility service entrance/interval meters are allowed as a means to fulfill this requirement provided they have AMR capability.
  - Digital type meters are required.
  - These requirements and thresholds apply to new construction and replacement of existing energy source systems (1203).
  - Existing buildings are allowed to reuse existing analog-type utility service entrance/interval meters.

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Whole Building Energy Supply Metering

TABLE 12-2
COMPONENT ENERGY MASTER SUBMETERING THRESHOLDS

Component	Submetering Threshold
Chillers/heat pump systems	> 70 kW (240,000 Btu/h) cooling capacity
Packaged AC unit systems	> 70 kW (240,000 Btu/h) cooling capacity
HVAC fan systems	> 15 kW (20 hp)
Exhaust fan systems	> 15 kW (20 hp)
Make-up air fan systems	> 15 kW (20 hp)
Pump systems	> 15 kW (20 hp)
Cooling towers systems	> 15 kW (20 hp)
Boilers, furnaces and other heating equipment systems	> 300 kW (1,000,000 Btu/h) heating capacity
General lighting circuits	> 15 kVA
Miscellaneous electric loads	> 15 kVA

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Energy Submetering

- 1202 Whole Building Energy Supply Metering – Sub-metering
  - Miscellaneous electric loads are any other electric load that is not cited in Table 12-2. This may include plug loads and electric circuits for items such as for commercial cooking and refrigeration equipment, elevators and escalators.
  - For subsystems with multiple similar units, such as multi-cell cooling towers, only one meter is required for the subsystem.
  - Current sensors or flow meters that have remote metering capability are allowed for submetering.
  - These requirements and thresholds apply to new construction and replacement of existing subsystems (1203)

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ENERGY METERING
NREC COMPLIANCE FORMS

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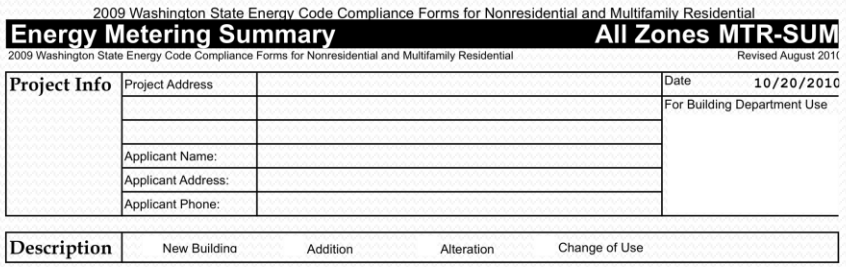
NREC Forms

- NEW! - Energy Metering Summary (MTR-SUM)
- NEW! - Energy Metering Systems Checklist (MTR-CHK)



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Energy Metering Summary **All Zones MTR-SUM**

2009 Washington State Energy Code Compliance Forms for Nonresidential and Multifamily Residential — Revised August 201

Project Info			
	Project Address		Date 10/20/2010
			For Building Department Use
	Applicant Name:		
	Applicant Address:		
	Applicant Phone:		

Description	New Building	Addition	Alteration	Change of Use

Table 12-1 Energy Meter Summary (enter values as applicable)

Energy Service	*Service Capacity*		*Total Meter for Building*		*Meter Type*
Electric Service		kVa	Yes	No	No
Renewable Electric		kVa	Yes	No	
Gas Service		kW	Yes	No	No
Steam Supply		kW	Yes	No	No
Geothermal		kW	Yes	No	No
Renewable Thermal		kW	Yes	No	No

Notes:

Table 12-2 Submeter Summary (required if 12-1 threshold exceeded)

Energy Use	*Total Circuit Capacity*		*Submeter Provided?*		
Chillers/heat pump		kW	Yes	No	No
Package AC		kW	Yes	No	No
HVAC fan		kW	Yes	No	No
Exhaust fan		kW	Yes	No	No
Makeup air fan		kW	Yes	No	No
Pump Systems		kW	Yes	No	No
Cooling Towers		kW	Yes	No	No
Boilers, furnaces, other heating		kW	Yes	No	No
General Lighting		kVA	Yes	No	No
Misc. Electric Loads		kVA	Yes	No	No

Notes:

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MECHANICAL SYSTEMS

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Ventilation

- 1402 Mechanical Ventilation (Revised)
  - The minimum requirements for ventilation shall comply with the **Washington State Mechanical Code (WAC 51-52).**
  - Washington Administrative Code (WAC) 51-51 is the State Building Code adoption and amendment of the 2009 edition of the International Mechanical Code.

- *WSEC 2006: Shall comply with Washington State Ventilation and Indoor Air Quality Code (WAC 51-13).*

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Complex System Sizing

- 1431.2 System Sizing Limits (New)
  - Heating and cooling design loads for the purpose of sizing systems shall be determined in accordance with one of the procedures described in Chapter 29 of Standard RS-1 listed in Chapter 7 or an equivalent computation procedure.
  - Interior temperatures criteria:
    - 70°F for heating and 75°F for cooling, or
    - Values as specified in the Washington Administrative Code (WAC).
  - Building mechanical systems for all buildings which provide space heating and/or space cooling shall be sized **no greater than 150 percent** of the design load as calculated above.

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Commissioning

- 1416 Commissioning and Completion Requirements
  - *Comment: This entire section has been replaced with new Code language. More detail and standard good practice criteria are spelled out.*
- 1416.4 Commissioning Compliance Form (New)
  - A commissioning compliance checklist shall be submitted to the building official upon substantial completion of the building.
  - The checklist shall be completed and signed by the building owner or owner's representative.
  - *Comment: This provides a reliable compliance deliverable and requires that the contractor/close out team goes on record as having completed all criteria.*

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Commissioning Compliance Checklist

FIGURE 14B
COMMISSIONING COMPLIANCE CHECKLIST

Project Information	**Project Name:** **Project Address:** **Commissioning Authority:**
Commissioning Plan (Section 1416.3.1)	❑ **Commissioning Plan was used during construction and included items below** • A written schedule including Systems Testing and Balancing, Functional Testing, and Supporting Documentation • Roles and Responsibilities of the commissioning team • Functional Test procedures and forms
Systems Balancing (Section 1416.3.2)	❑ **Systems Balancing has been completed** • Air and Hydronic systems are proportionately balanced in a manner to first minimize throttling losses • Test ports are provided on each pump for measuring pressure across the pump.
Functional Testing (Section 1416.3.3)	❑ **HVAC Systems Functional Testing has been completed** (Section 1416.3.3) HVAC systems have been tested to ensure that equipment, components, and sub-systems are installed, calibrated, adjusted and operate in accordance with approved plans and specifications ❑ **HVAC Controls Functional Testing has been completed** (Section 1416.3.3) HVAC controls have been tested to ensure that control devices are calibrated, adjusted and operate properly. Sequences of operation have been functionally tested to ensure they operate in accordance with approved plans and specifications ❑ **Lighting Controls Functional Testing has been completed** (Section 1513.7) Lighting controls have been tested to ensure that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications
Supporting Documents (Section 1416.3.4)	❑ **Systems documentation, record documents and training have been completed or are scheduled** • System documentation has been provided to the owner or scheduled date: _____ • Record documents have been submitted to owner or scheduled date: _____ • Training has been completed or scheduled date: _____
Commissioning Report (Section 1416.3.5)	❑ **Commissioning Report submitted to Owner and includes items below** • Completed Functional Tests documentation • Deficiencies found during testing required by this section which have not been corrected at the time of report preparation and the anticipated date of correction • Deferred tests, which cannot be performed at the time of report preparation due to climatic conditions or other circumstances beyond control of Commissioning Authority.
Certification	❑ I hereby certify that all requirements for Commissioning have been completed in accordance with Washington State Energy Codes, including all items above. _____ Building Owner or Owner's Representative Date

Equipment Efficiency Tables

- Tables 14-1A through 14-1F (Revised)
  - In general, most of the efficiencies are straight out of ASHRAE 90.1-2007.
  - Some tables have some values that are more stringent than ASHRAE 90.1-2007.
  - In general, all manufacturers have standard equipment selections compliant with the current 90.1 tables.
  - Several code sections have exceptions that can be used if better than code efficiencies are provided (i.e. economizer exceptions).
  - Those sections may or may not prove difficult to utilize. Talk to your vendors. Do the footwork.

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MECHANICAL SYSTEMS
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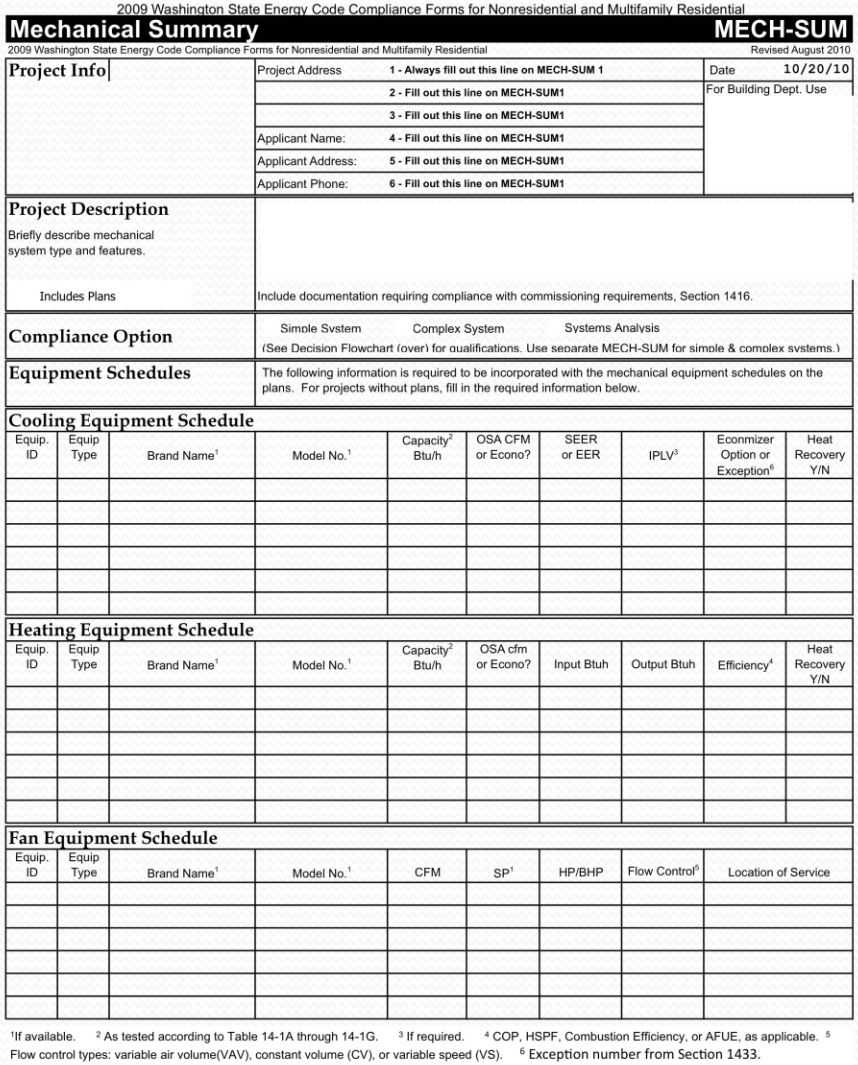
NREC Forms

- Mechanical Summary (MECH-SUM)
- Mechanical Complex Systems Checklist (MECH-COMP)
- Electric Motors (MECH-MOT)
- Mechanical Permit Plans Checklist (MECH-CHK)
- Economizer Flowchart



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

Mechanical Summary **MECH-SUM**

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

Project Info			
	Project Address	1 - Always fill out this line on MECH-SUM 1	Date 10/20/10
		2 - Fill out this line on MECH-SUM1	For Building Dept. Use
		3 - Fill out this line on MECH-SUM1	
	Applicant Name:	4 - Fill out this line on MECH-SUM1	
	Applicant Address:	5 - Fill out this line on MECH-SUM1	
	Applicant Phone:	6 - Fill out this line on MECH-SUM1	

Project Description	
Briefly describe mechanical system type and features.	
Includes Plans	Include documentation requiring compliance with commissioning requirements, Section 1416.

Compliance Option	Simple System Complex System Systems Analysis (See Decision Flowchart (over) for qualifications. Use separate MECH-SUM for simple & complex systems.)
Equipment Schedules	The following information is required to be incorporated with the mechanical equipment schedules on the plans. For projects without plans, fill in the required information below.

Cooling Equipment Schedule

Equip. ID	Equip Type	Brand Name[1]	Model No.[1]	Capacity[2] Btu/h	OSA CFM or Econo?	SEER or EER	IPLV[3]	Econmizer Option or Exception[6]	Heat Recovery Y/N

Heating Equipment Schedule

Equip. ID	Equip Type	Brand Name[1]	Model No.[1]	Capacity[2] Btu/h	OSA cfm or Econo?	Input Btuh	Output Btuh	Efficiency[4]	Heat Recovery Y/N

Fan Equipment Schedule

Equip. ID	Equip Type	Brand Name[1]	Model No.[1]	CFM	SP[1]	HP/BHP	Flow Control[5]	Location of Service

[1] If available. [2] As tested according to Table 14-1A through 14-1G. [3] If required. [4] COP, HSPF, Combustion Efficiency, or AFUE, as applicable. [5] Flow control types: variable air volume(VAV), constant volume (CV), or variable speed (VS). [6] Exception number from Section 1433.

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TECHNICAL SUPPORT AND RESOURCES

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Technical Support & Resources

- Recorded 2009 NREC Webinars – Approx. 1 hour each
  - Lighting and Energy Metering
  - Mechanical Systems
  - Building Envelope
  - PDF file versions also available
  - Available at - www.neec.net/Energy Codes

- NREC Technical Assistance
  - Stan Price – stan@putnamprice.com
  - Lisa Rosenow – lisa@putnamprice.com

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