DCLU

Director's Rule 13-2002

Applicant:	Page	Supersedes:
City of Seattle Department of Design, Construction and Land Use	1 of 4	31-90
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Subject: Solar Collectors: Eligibility Criteria and System Efficiency Requirements	**Code and Section Reference:** Seattle Energy Code; Land Use Code Sections 23.44.014, 23.44.046, 23.45.146	
	Type of Rule: Code Interpretation	
	Ordinance Authority: SMC 3.06.040	
Index: Land Use Code - Technical Requirements Energy Code	**Approved** **Date** (signature on file) 9/16/02 Diane M. Sugimura, Acting Director	

1. POLICY INTENT

The Land Use Code, consistent with the adopted Single- and Multifamily Land Use Policies, includes provisions which encourage the use of sunlight as an energy source. These include exemptions from lot coverage, extra height and reduced setback requirements. Solar collectors will qualify for these provisions if they meet energy standards established and administered by the Department of Design, Construction and Land Use (DCLU). The intent is to permit such collectors where:

(a) the collectors are applied to structures and uses that are significantly more energy efficient than the minimum Energy Code requirements, and

(b) the collectors are oriented to maximize their solar collection potential, and are part of a system that meets a reasonable minimum seasonal operating efficiency.

2. CRITERIA FOR SPACE HEATING SYSTEMS

Solar systems that are used for space heating purposes shall comply with 2A and 2B.

A. Energy Efficiency Requirements for the Building Envelope of the Entire Dwelling Unit.

1. New construction (projects subject to the 2001 Washington State Energy Code or later Energy Code). To be eligible, the entire dwelling unit shall comply with the following requirements:

a.	Roof insulation (attic):	R-49 minimum
b.	Roof insulation (single-rafter vaulted):	R-38 minimum
c.	Wall insulation (above-grade):	R-21 cavity + R-5 cont. sheathing min.
d.	Wall insulation (below-grade):	R-21 minimum
e.	Floor insulation over unheated space:	R-30 minimum
f.	Slab on grade floor perimeter insulation:	R-15 minimum
g.	Glazing U-factor (weighted average):	U-0.30 maximum
h.	Glazing area (% of heated floor area):	15% maximum (does not include glazing which qualifies as a solar collector)

2. Existing construction (projects subject to the 2000 Washington State Energy Code or previous). To be eligible, the design heat loss of the existing dwelling unit shall be:

   a. For dwelling units constructed from 1980 to 2000, a minimum of 20% below the Energy Code Target UA requirements in effect at the time of construction (unless the dwelling complies with the requirements in 2.A.1 above).
   b. For dwelling units constructed prior to 1980, reduced by 20% (unless insulation is R-38 min. for roof attic, R-11 min. for wood- and metal-frame wall, R-30 min. for floor over unheated space, and glazing is area-weighted U-0.40 maximum).

   Calculations shall be performed using the Seattle Heating Equipment Sizing Form or equivalent. The total design heat loss shall include infiltration, but no credit shall be given for infiltration reduction.

B. Solar Collector and Solar System Requirements.

1. Collector systems within the heated area of the dwelling unit. All collector systems which are within the heated structure, such as south-facing windows and heated sunspaces, shall comply with the following requirements:

a.	Glazing U-factor:	U-0.30 maximum (weighted average)
b.	Glazing orientation:	80% within 30 degrees of true south, and 100% within 90 degrees of true south
c.	Glazing angle:	60 degrees minimum up from horizontal
d.	Glazing transmission:	0.80 minimum per glazing layer
e.	Solar exposure:	4 hours min. between 8 am and 4 pm on January 21, and 4 hours minimum between 8 am and 4 pm on March 21 (Based on solar time, documentation shall be provided in the form of a sun chart – see CAM 417.)
f.	Heat storage:	45 Btu/ºF·ft^2 of collector glazing area minimum (Mass shall be located within the insulated shell, not covered by materials such as carpet, and within the

space containing the collector glazing or with an approved means of transferring the heat.)

2. Other collector systems. Other collector systems, such as unheated sunspaces and freestanding or attached solar panels shall comply with the following requirements:

   a. Glazing orientation: 100% within 30 degrees of true south (glazing not allowed to face other orientations)
   b. Glazing angle: 60 degrees minimum up from horizontal
   c. Solar exposure: 4 hours min. between 8 am and 4 pm on January 21, and 4 hours minimum between 8 am and 4 pm on March 21
      (Based on solar time, documentation shall be provided in the form of a sun chart – see CAM 417.)
   d. Seasonal efficiency: collection, storage, and distribution system capable of delivering to the heated portion of the dwelling unit a minimum of 20% of the total solar energy received from October to April by the collector as determined by a licensed mechanical engineer
      (The building permit application shall include the mechanical drawings necessary to document the design assumptions and components of the solar collection system including:
      - means to transfer heat energy to and from storage (air, water, glycol),
      - mechanism to transfer heat energy to and from storage (fans, pumps, passive thermosiphon), and
      - heat storage media to prevent overheating (rock, water, phase change materials).)
   e. Thermal isolation: isolated from the heated space, such as for unheated sunspaces, by walls, glazing, etc., which meets the requirements of 2A above (except for air vents which may be closed at night), and not accessible from the heated area of the structure except through an exterior quality door no wider than 3 feet.

3. CRITERIA FOR SERVICE WATER HEATING SYSTEMS

Solar systems that are used for service water heating purposes shall comply with 3A and 3B.

A. Water Efficiency Requirements for the Entire Dwelling Unit. The service water heating system shall comply with the following requirements:

   1. Showerhead flow rate: 2.5 gpm maximum
   2. Hot water tank wrap: R-11 minimum
   3. Hot water pipe insulation: 2 inches minimum on pipes outside of the heated space

B. Solar Collector and Solar System Requirements. Solar collector systems shall comply with the following requirements:

1. Glazing orientation: 100% within 30 degrees of true south
2. Glazing angle: 30-60 degrees up from horizontal
3. Solar exposure: 4 hours minimum between 8 am and 4 pm on March 21 (Based on solar time, documentation shall be provided in the form of a sun chart – see CAM 417.)
4. Seasonal efficiency: collection, storage, and distribution system capable of delivering to the heated portion of the dwelling unit a minimum of 20% of the total solar energy received for the full year by the collector as determined by a licensed mechanical engineer

(The service water heating permit application shall include the mechanical drawings necessary to document the design assumptions and components of the solar collection system including:

- means to transfer heat energy to and from storage (water, glycol),
- mechanism to transfer heat energy to and from storage (pumps, passive thermosiphon), and
- heat storage media (water, phase change materials).)

4. CRITERIA FOR POOL HEATING SYSTEMS

Solar systems that are used for pool heating purposes shall comply with 4A and 4B.

A. Pool Efficiency Requirements. The pool shall have a pool cover at the surface of the water.

B. Solar Collector and Solar System Requirements. Solar collector systems shall comply with the following requirements:

1. Glazing orientation: 100% within 30 degrees of true south
2. Glazing angle: 15-45 degrees up from horizontal
3. Solar exposure: 4 hours minimum between 8 am and 4 pm on June 21 (Based on solar time, documentation shall be provided in the form of a sun chart – see CAM 417.)
4. Seasonal efficiency: collection, storage, and distribution system capable of delivering to the heated portion of the dwelling unit a minimum of 20% of the total solar energy received from May to September by the collector as determined by a licensed mechanical engineer

(The pool heating permit application shall include the mechanical drawings necessary to document the design assumptions and components of the solar collection system including:

- means to transfer heat energy (water, glycol), and
- mechanism to transfer heat energy (pumps, passive thermosiphon).)