

## Quick Reference Guide for HVAC

This guide is intended to serve as a quick reference for building inspectors and contractors. Systems installed per these requirements will comply with the pertinent sections of the 2013 Building Energy Efficiency Standards (Title 24, Part 6 of the California Building Standards Code).

Heating Equipment			
System Type Efficiency	Efficiency Rating	Manufactured Before Jan 1, 2015	Manufactured After Jan 1, 2015
Central Gas Furnace (<225,000 Btu/hr Input) <sup>1</sup>	AFUE	80%	80%
Single Phase Air Source Heat Pumps <65,000 Btu/hr Cooling Capacity (packaged) <sup>2</sup>	HSPF	7.7	8
Single Phase Air Source Heat Pumps <65,000 Btu/hr Cooling Capacity (Split) <sup>2</sup>	HSPF	7.7	8.2
Hydronic Heating (Gas Hot Water Boilers <300,000 Btu/Hr Input) <sup>3</sup>	AFUE	82	
<b>Wall Furnace<sup>4</sup></b>	<b>AFUE</b>	<b>Capacity</b>	
Wall Furnace (fan type)	73%	≤42,000 Btu/hr	
	74%	>42,000 Btu/hr	
Wall Furnace (gravity type)	59%	≤10,000 Btu/hr	
	60%	>10,000 & ≤12,000 Btu/hr	
	61%	>12,000 & ≤15,000 Btu/hr	
	62%	>15,000 & ≤19,000 Btu/hr	
	63%	>19,000 & ≤27,000 Btu/hr	
	64%	>27,000 & ≤46,000 Btu/hr	
	65%	>46,000 Btu/hr	
Standards Section	Mandatory Requirements for Heating Systems		
Heating System Controls §150.0(i), 110.2(b), Exceptions to §110.2(b), 110.2(c), Exception to 110.2©	All typical heating systems must be controlled by a setback thermostat which must allow the occupant to program the temperature set points for at least four different periods in 24 hours. <b>Exception:</b> If the heating system is integrated into a central energy management control system (EMCS), then that system does not need to comply with the setback requirements. Additionally, all gravity gas wall heaters, floor heaters, room heaters and fireplaces, decorative gas appliances wood stoves and non-central electric heaters do not need to be controlled by a setback thermostat.		
Equipment Sizing §150.0(h)1 and 2	The Energy Code does not set limits on the sizing of heating equipment, but they do require that heating loads be calculated for new heating systems. Best Practice: substantial oversizing should be justified by the designer. <sup>5</sup>		
Furnace Temperature Rise §150.0(h)4	Central forced-air heating furnace installations must be configured to operate at or below the furnace manufacturer's maximum inlet-to-outlet temperature rise specification.		
Standby Losses and Pilot Lights §110.5 and §110.2(d)	Fan-type central furnaces should not have a continuously burning pilot light. <b>Exception:</b> This requirement does not apply to wall furnaces, floor furnaces or any gravity type furnace.		
Pipe Insulation §150.0(j)2C, §150.0(j)3, §120.3	Installed Insulation must be ≥ 1". See table 120.3A for Hydronic Heating over 140° F.		

1 See California Appliance Efficiency Regulations Title-20- Table E-4.

2 See Table 4.3- Minimum Heating Efficiency for Heat Pumps. See California Appliance Efficiency Regulations Title-20- Table C-2.

3 See Table 4.4- Minimum Heating Efficiency for Gas and Oil Fired Central Boilers. See California Appliance Efficiency Regulations Title-20- Table E-3.

4 Efficiency Varies by Rated BTU/hr Input. See California Appliance Efficiency Regulations Title-20- Table E-2.

5 The load calculations may be prepared by 1) a mechanical engineer, 2) the mechanical contractor who is installing the equipment, or 3) someone who is qualified to do so in the State of California according to Division 3 of the Business and Professions Code.

### Cooling Equipment

System Type Efficiency <sup>6</sup>	Efficiency Rating	Manufactured Before Jan 1, 2015	Manufactured After Jan 1, 2015
Split System <45,000 Btuh	SEER	13.00	14.00
Split System >45,000 Btuh			
Single Package and Central Air Conditioners (Split and Package Systems)			
Split System <45,000 Btuh	EER	N/A	12.20
Split System >45,000 Btuh	EER	N/A	11.70
Single Package	EER	N/A	11.00
Central Air Source Heat Pumps (Split and Package System)	EER	N/A	N/A

Standards Section	Mandatory Requirements for Cooling Systems
Insulation for Refrigerant in Split System Air Conditioners §150.0(j)2 and 3, §150.0(m)9	The liquid line and the suction line connect the indoor and outdoor units of split systems. The liquid line is at an elevated temperature relative to outdoor and indoor temperatures and should not be insulated. The suction line carries refrigerant vapor that is cooler than ambient in the summer and (with heat pumps) warmer than ambient in the winter, so this line must be insulated ≥1". Insulation used for the suction line must be protected from physical damage or from UV deterioration when it is located in outside conditioned space. Pipe insulation is typically protected by an aluminum or sheet metal jacket, painted canvas, plastic cover, or coating that is water retardant and UV resistant. Additionally, the insulation used for the refrigerant suction line of a heat pump must be made for refrigerant lines. Typically these lines come pre-insulated from the manufacture and meet the requirements.
Outdoor Condensing Unit Clearance §150.0(h)3	Condensing units shall not be placed within 5 feet of a dryer vent.
Equipment Sizing §150.0(h)	The Standards do not set limits on the size of cooling equipment, but they require cooling loads be calculated for completely new systems. Cooling load calculations must be submitted with compliance documentation when requested by the building department. <sup>7</sup>
Hole for Static Pressure Probe (HSPP) or Permanently Installed Static Pressure Probe (PSPP) §150.0(m)13	Space conditioning systems that utilize forced air ducts to supply cooling to occupiable space shall have a hole for the placement of a static pressure probe (HSPP) or permanently installed static pressure probe (PSPP) installed downstream from the evaporator coil. <sup>8</sup>

### Ducting Requirements

Standards Section	Mandatory Requirements for Ducting
Minimum Insulation §150.0(m)1, §150.0(m)1 Exception to §150.0(m)1, §150.0(m)5	The minimum allowed duct insulation value is R-6, unless the ducts are enclosed entirely in directly conditioned space, OR the ducts and fans are integral to a wood heater or fireplace. However, higher R values may be required for prescriptive projects.
Connections and Closures §150.0(m)1, §150.0(m)2, §150.0(m)3	See duct insulation standards, Residential Compliance Manual Section 4.4.4
Duct Systems	Factory-made rigid fiberglass and flexible ducts for field-fabricated duct systems must comply with UL 181. All pressure-sensitive tapes, heat-activated tapes, mastics, aerosol sealants, or other closure systems used for installing field-fabricated duct systems shall meet the applicable requirements of UL 181A, and/or UL 181B, and sealants must be nontoxic and water resistant. Joints and seams of duct systems and their components cannot be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands OR it has on its backing the phrase "CEC approved", a drawing of a fitting to plenum joint in a red circle with a slash through it, and a statement that it cannot be used to seal fittings to plenums and junction box joints.
Ducts in Concrete Slabs	Ducts located in a concrete slab must have R-6 insulation. If ducts are located in the soil beneath the slab or embedded in the slab, the insulation material should be designed and rated for such installation, and should resist moisture penetration.

<sup>6</sup> See California Appliance Efficiency Regulations Title-20- Table C-2.

<sup>7</sup> The load calculations may be prepared by 1) a mechanical engineer, 2) the mechanical contractor who is installing the equipment or 3) someone who is qualified to do so in the State of California according to Division 3 of the Business and Professions Code.

<sup>8</sup> To be verified by a HERS Rater