

SYSTEMS APPROACH

HEATING, VENTILATION, AND AIR CONDITIONING SYSTEMS (HVAC)

The design of high-performance HVAC systems includes specification of high-efficiency equipment and controls that regulate the system to allow operation only when it is needed. Thoughtful consideration of the interactions of all system elements can substantially increase comfort for building occupants while cutting costs for the building owner.

Incentives for HVAC systems are calculated using \$0.15 per annualized kWh savings, \$1.00 per annualized therm savings, and \$100.00 per peak KW saved, subject to all applicable caps. An optimized

HVAC system will typically include the following measures:

- High-efficiency packaged units
- High-efficiency heat pumps
- High-efficiency furnaces
- High-efficiency water-cooled chillers
- High-efficiency boilers
- Variable speed motor drives on system fans and pumps
- Premium efficiency motors
- Demand-controlled ventilation
- Low solar heat gain coefficient (SHGC) glazing
- Cool roofs

* For Savings By Design, the efficiency of unitary systems, including units less than 65 kBtuh, is measured in EER. Units with electric resistance heating sections do not qualify.

** Title 24 Energy Efficiency Standard or Title 20 Appliance Standard.

*** Chillers with CFC refrigerants and air-cooled chillers are not eligible for incentives.

+ kW/ton calculated using ARI operating conditions.

a = AFUE

c = Combustion Efficiency

HVAC GUIDELINES

UNITARY SYSTEMS*

AIR-COOLED AC	kBtuh	Program	SAVINGS BY DESIGN
		Baseline**	Minimum
		EER	EER
Split System AC	< 65	-	11.6
Packaged AC	< 65	-	11.6
Packaged AC	≥ 65 & < 135	11.0	11.6
Packaged AC	≥ 135 & < 240	10.8	11.3
Packaged AC	≥ 240 & < 760	9.8	10.3
Packaged AC	≥ 760	9.5	10.0
AIR-COOLED HP			
Split System HP	< 65	-	11.6
Packaged HP	< 65	-	11.6
Packaged HP	≥ 65 & < 135	11.0	11.6
Packaged HP	≥ 135 & < 240	10.6	11.1
Packaged HP	≥ 240	9.5	10.0
EVAPORATIVE OR WATER-COOLED			
Packaged AC	< 65	12.1	14.0
Packaged AC	≥ 65 & < 135	11.5	14.0
Packaged AC	≥ 135	13.1	14.0
Packaged Water-Source HP	< 17	11.2	14.0
Packaged Water-Source HP	≥ 17 & < 135	12.0	14.0
Packaged Water-Source HP	≥ 135	9.6	11.1
FURNACES			
	kBtuh	AFUE	AFUE
Small Central Furnaces	< 225	78%	90%
CHILLERS***			
	TONS	kW/ton+	kW/ton+
Reciprocating	All Capacities	0.837	0.795
Rotary Screw & Scroll	< 150	0.790	0.750
Rotary Screw & Scroll	≥ 150 & < 300	0.718	0.640
Rotary Screw & Scroll	≥ 300	0.639	0.617
Centrifugal	< 150	0.703	0.679
Centrifugal	≥ 150 & < 300	0.634	0.590
Centrifugal	≥ 300	0.576	0.560
BOILERS			
	kBtuh	EFFICIENCY	EFFICIENCY
Steam Boilers	<300	75.0% a	81.4% a
Steam Boilers	≥ 300 & < 2500	75.0% t	79.5% t
Steam Boilers	≥ 2500	80.0% c	84.8% c
Water Boilers	< 300	80.0% a	84.4% a
Water Boilers	≥ 300 & < 2500	75.0% t	79.5% t
Water Boilers	≥ 2500	80.0% c	84.8% c

SERVICE HOT WATER SYSTEMS

The use of high-efficiency natural gas hot water heaters can help to round out an overall approach to energy savings in the building design. Systems that use large amounts of hot water can see substantial savings when high-efficiency units are used.

Incentives for service hot water systems are calculated using \$1.00 per annualized therm savings.

NATURAL GAS SERVICE HOT WATER GUIDELINES

	Input Ratings (kBtuh)	Volume (Gallons)	Input to Volume Ratio (Btuh/Gal)	Title 24 Minimum Efficiency	SAVINGS BY DESIGN Minimum Efficiency
STORAGE TYPE					
	≤ 75	≥ 20	-	EF = 0.67 - (0.0019V)	EF * 1.075
	> 75	All	< 4,000	80% t	90% t
INSTANTANEOUS TYPE					
	≤ 200	-	-	EF = 0.62 - (0.0019V)	EF * 1.4

EF = Energy Factor V = Rated Volume t = Thermal Efficiency

OTHER SYSTEMS AND PROCESSES

Processes and other systems not covered under California's Title 24 Energy Efficiency Standards can account for a significant portion of total energy use. SAVINGS BY DESIGN offers energy-efficiency design assistance and financial incentives to help optimize these systems. Process systems and controls that can be considered for the program include, but are not limited to:

- Ventilation systems, such as those found in laboratories, clean rooms, and hospitals.
- Pumping systems; for example, those found in waste water treatment plants, dairy processes, and petroleum transport.
- Refrigeration for food processing plants, distribution centers, and warehouses.
- Drivepower systems including conveying, transporting, and manufacturing systems.
- Compressed air for aeration, pneumatic tools, and control or transport systems.
- Process cooling and heating associated with paint drying, paper manufacturing, and plastic extrusions.
- Heat recovery/rejection as found in ice rinks, swimming pools, or laundries.
- Other manufacturing processes, such as injection molding, food preparation equipment, and milling equipment.

Incentives for Other Systems and Processes are calculated using \$0.09 per annualized kWh savings, \$1.00 per annualized therms savings, and \$100 per peak KW saved for all measures, subject to all applicable caps.

