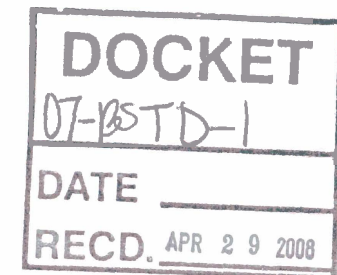


Residential Swimming Pools

PG&E Codes And Standards Enhancement (CASE) Study



**Pacific Gas and
Electric Company**

Codes & Standards Enhancement Project



DAVIS ENERGY GROUP
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Proposed Measures & Findings



1. MOTOR EFFICIENCY REFERENCE
2. MINIMUM TURNOVER TIME
3. EFFICIENT PIPE & FITTING DESIGN
4. FILTER SIZING AND SELECTION
5. DEMAND RESPONSE
6. POOL COVERS

1. Motor Efficiency Reference

- Require that pump is listed with the CEC
 - Energy efficient type motor
 - Cross reference Title 20



ENERGY SAVINGS

10% or 260 kWh/pool annually.

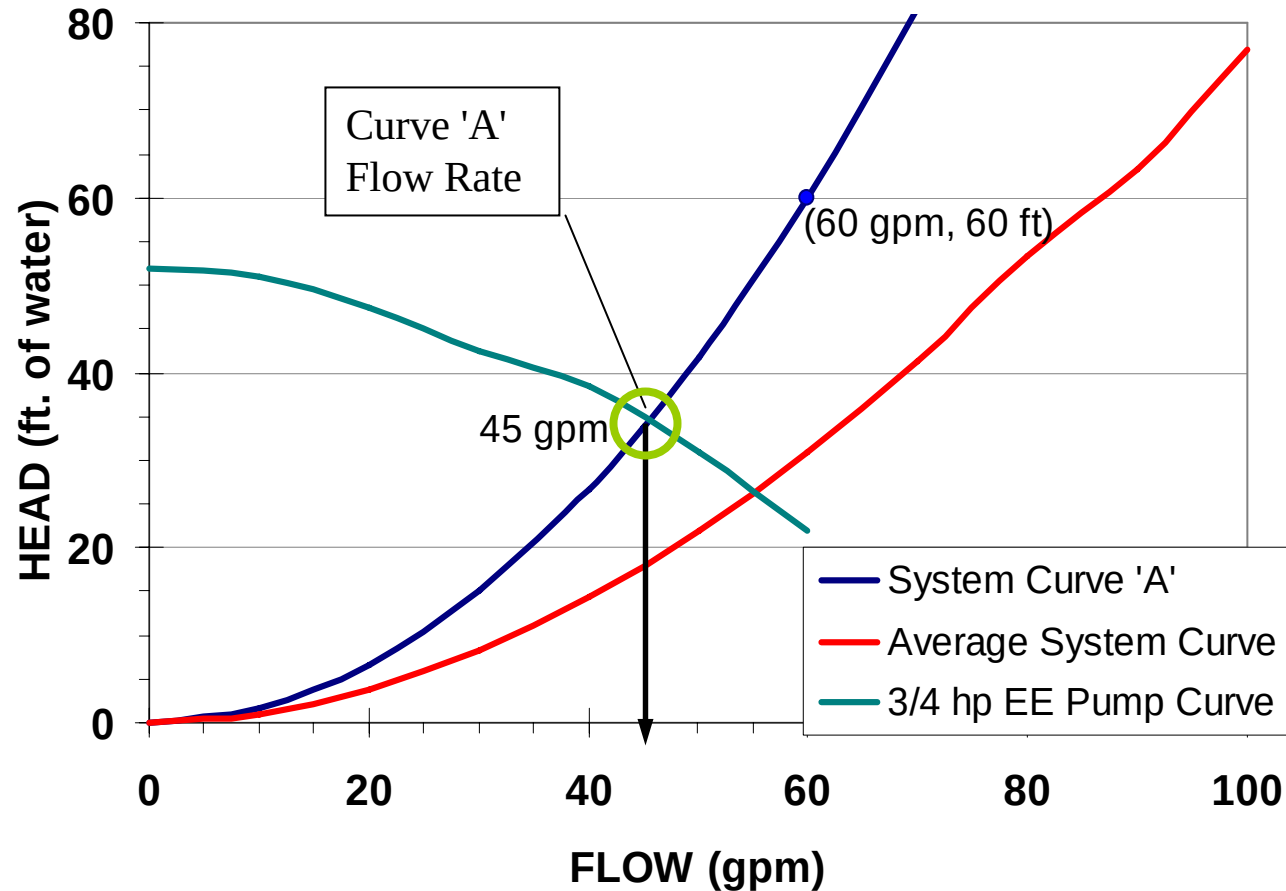
2. Minimum Turnover Time

- Filtration flow rate set for a minimum 6-hour turnover time.
 - $\text{Max Filtration Rate (gpm)} = \text{Volume of Pool (gallons)} \div 360 \text{ min}$
- The selected pump shall have a Curve 'A' Flow Rate less than the Filtration Flow Rate
 - with Multi-speed pumps, use the low Curve 'A' Flow Rate

ENERGY SAVINGS

53% or 1450 kWh/pool annually

2. Minimum Turnover Time (cont.)



3. Pipe Design & Efficient Fittings



3. Pipe Design & Efficient Fittings (cont.)

Pipe sizing according to maximum velocities of 8 and 6 fps in the return and suction lines, respectively.

<i>Flow rate (high speed if multi-speed pump)</i>	<i>Pipe Diameter</i>	
	<i>Return</i>	<i>Suction</i>
up to 23 gpm	1	1.25
24 to 33 gpm	1.25	1.5
34 to 59 gpm	1.5	2
60 to 92 gpm	2	2.5
93 to 132 gpm	2.5	3
133 to 235 gpm	3	4
236 to 367 gpm	4	5



Efficient Pipe Fittings (short radius 90° on the left and hard 90° elbow on the right.)

3. Pipe Design & Efficient Fittings (cont.)

ENERGY SAVINGS

<i>Description</i>	<i>Annual Energy Savings</i>	
	<i>(kWh/pool)</i>	<i>%</i>
4D of straight pipe on suction side of pump	104	4%
Maximum velocity of 8 fps return and 6 fps suction	403	15%
Sweep elbows	31	1%

4. Filter Sizing and Selection

- The filter shall be sized according to flow rate
- Similar to commercial pool recommendations

Filter Type	Max Flow Per Area (gpm/sqft)
Cartridge	0.375
Sand	20
Diatomaceous Earth (DE)	2



4. Filter Sizing and Selection (cont.)

ENERGY SAVINGS

<i>Description</i>	<i>Annual Energy Savings</i>	
	<i>(kWh/pool)</i>	<i>%</i>
Correctly sized filters	13	0.5%
Correctly sized MPV valves	159	5.9%

5. Demand Response Findings

First Year Savings in 2008 TDV\$ (per pool)

	<i>Base Case</i>	<i>Proposed Design Measures</i>
No Demand Response	\$6,215	\$3,056
With Demand Response	\$5,910	\$2,912
Savings	\$305	\$144

6. Pool & Spa Covers

- Current Title 24 mandates outdoor pool & spa covers if more than 40% is heated without solar heaters.
- Based on industry feedback regarding current practice and enforcement:
 - Proposing to remove requirement for pools.
 - Proposing to keep requirement for spas.

All Design Measures Applied



ENERGY SAVINGS

- Annual Energy Savings:
1,600 kWh per pool
- First Year Statewide Energy Savings:
57 GWh
(35,000 new construction pools)

All Design Measures Applied



DEMAND SAVINGS

- Annual Demand Savings:
970 W per pool
- First Year Statewide Demand Savings:
34 MW
(35,000 new construction pools)

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