Good Afternoon

HERS Verifications

and

California Residential Energy Standards
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Brief History of California Residential Energy Standards

1973  Gas lines and energy storages

1977  Legislation created California Energy Commission and mandated residential energy standards.
Brief History of California Residential Energy Standards (cont)

1978  First energy standards based on

R-19 Attic

R-11 Walls

Single Pane windows (16%)

Trade-offs allowed based on equivalent heat loss.
1983 True performance based standards using computer simulation (CALPAS & Micropas most common programs).

Loud hue and cry from industry.

Standards delayed 11 months at last minute.

Increase in energy efficiency remarkable.
Brief History of California Residential Energy Standards (cont)

1999 Residential Energy Standards include optional HERS verification requirements.
2001 Residential Manual

Available in PDF format from the CEC website:

Publication # P400-01-022

www.energy.ca.gov/title24
California Climate Zones
Compliance Approaches

Mandatory Measures

Plus

Prescriptive Package

or

Computer Performance Methods
Prescriptive Packages

- No trade-offs allowed between measures
- Seldom used for new construction
- Very common for additions
<p>| 40 NR | East-facing glazing | NR | 0.40 | NR | 0.40 | NK | 0.40 | NK | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | U | 0 |
| 40 NR | North-facing glazing | NR | 0.40 | NR | 0.40 | NR | 0.40 | NR | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| IR NR | THERMAL MASS$^5$ | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | N |
| Io No | Electric-resistant allowed | No | No | No | No | No | No | No | No | No | No | No | No | No | No | N |
| IN MIN | If gas, AFUE = | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | N |
| IN MIN | If heat pump, split system HSPF$^8$ = | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | N |
| IN MIN | Single package system HSPF = | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | N |
| SPACE-COOLING SYSTEM | | | | | | | | | | | | | | | | | |
| IN MIN | If split system A/C, SEER = | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | N |
| :Q* NR | Refrigerant charge and airflow testing or TXV | NR | REQ* | NR | NR | NR | NR | NR | NR | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | RI |
| IN MIN | If single package A/C, SEER = | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | N |
| SPACE CONDITIONING DUCTS | | | | | | | | | | | | | | | | | |
| :Q* REQ* | Duct Sealing | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | RI |
| DOMESTIC WATER-HEATING TYPE (System must meet budget, see §151 (b) 1 and (f) 8 and Tables 3-14 to 3-17) | | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | A |
| East-facing glazing | NR | 0.40 | NR | 0.40 | NR | 0.40 | NR | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | NR |
| North-facing glazing | NR | 0.40 | NR | 0.40 | NR | 0.40 | NR | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | NR |
| THERMAL MASS$^5$ | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| SPACE-COOLING SYSTEM | | | | | | | | | | | | | | | | | |
| IN MIN | If split system A/C, SEER = | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN |
| :Q* NR | Refrigerant charge and airflow testing or TXV | NR | REQ* | NR | NR | NR | NR | NR | NR | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | NR |
| IN MIN | If single package A/C, SEER = | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN | MIN |
| SPACE CONDITIONING DUCTS | | | | | | | | | | | | | | | | | |
| :Q* REQ* | Duct Sealing | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | REQ* | RI |
| DOMESTIC WATER-HEATING TYPE (System must meet budget, see §151 (b) 1 and (f) 8 and Tables 3-14 to 3-17) | | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any | Any |</p>
<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>Window SHGC</th>
<th>Roof</th>
<th>Window U-Factor</th>
<th>Duct</th>
<th>TXV</th>
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<td>-</td>
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<tr>
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<td>0.6</td>
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</table>
Computer Performance Method

Trade-offs allowed between all measures except mandatory measures
**HERS Required Verification**

These features must be confirmed and/or tested by a certified HERS rater under the supervision of a CEC approved HERS provider. The HERS rater must document the field verification and diagnostic testing of these measures on a form CF-6R.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Field</th>
</tr>
</thead>
</table>

The HVAC System "Res HVAC" includes Refrigerant Charge and Airflow Credit (or a TXV). A certified HERS rater must provide verification of the TXV, or measure the Refrigerant Charge and Airflow.

The HVAC System "Res HVAC" is using reduced duct leakage to comply and must have diagnostic site testing of duct leakage performed by a certified HERS Rater. The results of the diagnostic testing must be reported on a CF-6R Form.

This house has tight construction with reduced infiltration and a target blower door test range between 786 and 1833 CFM at 50 pascals. The blower door test must be performed using the ASTM Standard Test Method for Determining Air Leakage Rate.

**WARNING** - If this house tests below 786 CFM at 50 pascals, the house must either be provided with a ventilation opening that will increase the infiltration to this level (SLA=1.5) OR mechanical supply ventilation must be provided.
HERS Verified Measures

1. Tight Ducts
2. Reduced Infiltration
3. TXV
4. ACCA Manual D
5. Ducts in Conditioned Space
6. Reduced Duct Surface Area
How Did It Happen - Doug’s Opinion

1. Energy “crisis” in California
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2. Strong Energy Commission (CEC)
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3. Basic cost effectiveness of measures
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4. Additional design flexibility for industry
How Did It Happen - Doug’s Opinion

1. Energy “crisis” in California
2. Strong Energy Commission (CEC)
3. Basic cost effectiveness of measures
4. Additional design flexibility for industry
5. Support of organizations such as NRDC
How Did It Happen - Doug’s Opinion

6. Role or impact of Building Inspector organizations (CALBO & ICBO’s)
How Did It Happen - Doug’s Opinion

6. Role or impact of Building Inspector organizations (CALBO & ICBO’s)

7. Availability of energy consultants (CABEC)
How Did It Happen - Doug’s Opinion

6. Role or impact of Building Inspector organizations (CALBO & ICBO’s)

7. Availability of energy consultants (CABEC)

8. CHEERS - Proven track record in the state and able to work with CEC