

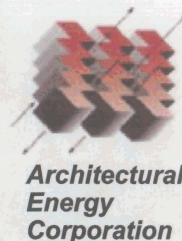
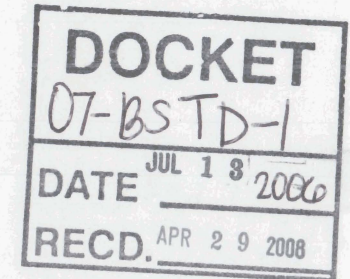
Standard 90.1 Measures

2008 California Building Energy Efficiency Standards

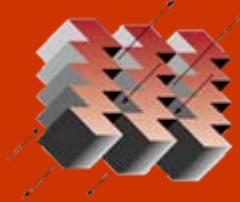
*Public Workshop
July 13, 2006*

Charles Eley, AEC

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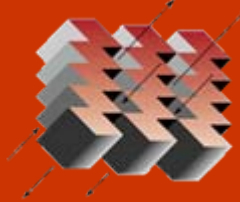
Loading Dock Weather Seals



- Require cargo doors and loading dock doors to be equipped with weather seals to restrict infiltration when vehicles are parked in the doorway.
- This requirement would be a mandatory measure for doors adjacent to conditioned spaces in California climate zones 1 and 16 only.



Vestibules



- Require vestibules or revolving doors in buildings with four or more stories for all California climate zones.
- Vestibule doors shall be equipped with self-closing devices and shall be adequately separated from each other to prevent interior doors and exterior doors from being open at the same time.
- There are several exceptions to the proposed change which are noted in the recommendations section.



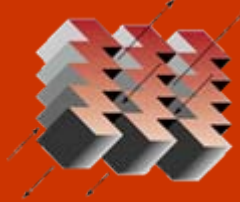
Opaque Doors



- Require opaque doors to have a U-factor not greater than 0.70 for swinging doors and 1.45 for non-swinging doors in California climate zones 2 through 15.
- The requirement for climate zones 1 and 16 would be the same for swinging doors, but more stringent for non-swinging doors, with an allowable U-factor not to exceed 0.50.
- This requirement would apply to exterior doors of conditioned space.



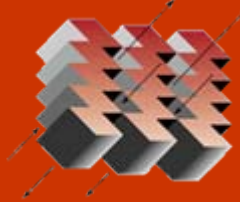
Loose-fill Insulation



- Limit open-blown or poured loose-fill insulation in attic roof spaces when the slope of the ceiling is more than three in twelve.
- Loose-fill insulation has a tendency to settle downward when used above ceilings with a steep slope, leaving the top of the ceiling with insufficient insulation.
- This limitation would be applicable to both residential and nonresidential buildings.



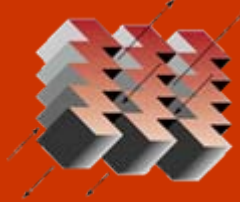
Humidification and Dehumidification Controls



- Require dead band controls within zones served by both humidification and dehumidification systems to prevent simultaneous operation.
- This would be a requirement for buildings in all California climate zones that have both humidification and dehumidification equipment.
- Exceptions to this requirement include zones served by desiccant systems that are used with direct evaporative cooling in series and zones where specific humidity levels are required, such as book archives, fand museums.



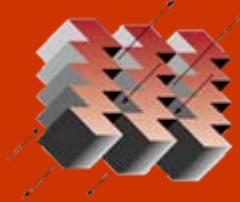
Hydronic Heat Pump Controls



- Require water loop heat pump systems to be capable of at least a 20°F dead band supply temperature between heat rejection and heat addition.
- This requirement does not apply when a system loop temperature optimization controller is used to determine the most efficient operating temperature.
- The proposed change is intended to prevent the simultaneous operation of central heating and cooling devices.



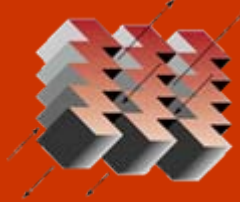
Energy Benefits



- A loading dock weather seal requirement for cold climates (CZ 1 and 16) would reduce the unintended exchange of air between conditioned and unconditioned spaces, thereby reducing the energy required for space conditioning.
- Vestibule doors at a building entrance would reduce the flow of unconditioned air into the conditioned space. Additionally, air trapped inside the vestibule would act as a buffer to the transfer of heat through the vestibule, thereby increasing the thermal resistance of the passageway.
- As U-factor is a measure of heat flow through a material, a U-factor requirement for exterior doors would reduce the energy required for space conditioning.
- Limiting the installation of loose-fill insulation to attics with gently sloped ceilings will improve insulation quality and continuity and subsequently reduce space conditioning loads.
- The water loop heat pump loop temperature deadband would reduce energy used to cool and heat the loop.
- The deadband for humidity control will reduce energy use for the systems covered.



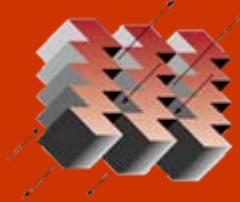
Non-Energy Benefits



- The proposed changes would reduce drafts and improve thermal comfort, resulting in greater occupant productivity.
- Higher property values may result if energy bills and comfort are taken into account in property valuation. In the case of loading dock weather seals, the loading dock would provide more isolated from inclement weather conditions such as rain and snow that could create hazardous conditions for workers.
- The proposed changes would have an insignificant effect on maintenance and operation.



Other Issues



● Environmental Impact

- Apart from reduced energy use, which is a positive impact, there are no significant environmental impacts associated with the proposed changes.

● Technology Measures

- The technologies that would be required by the proposed changes are already mature in the market. Furthermore, there are no issues related to useful life, persistence or maintenance.

● Performance Verification

- Performance verification or acceptance testing is not applicable to the proposed changes.

● Cost Effectiveness

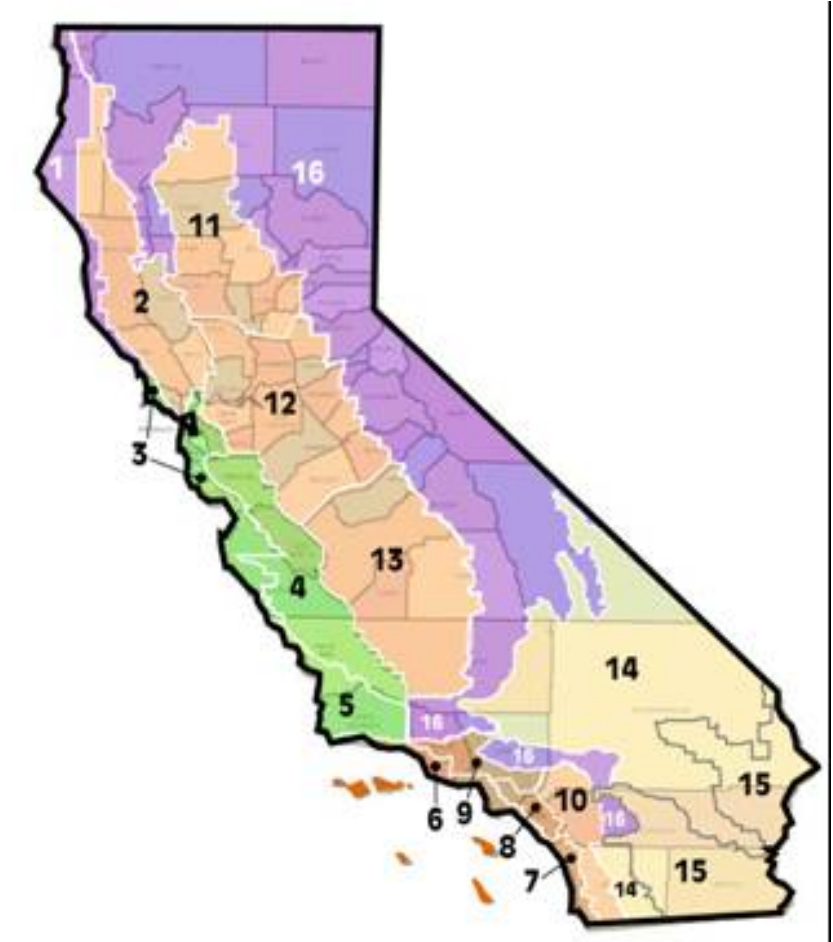
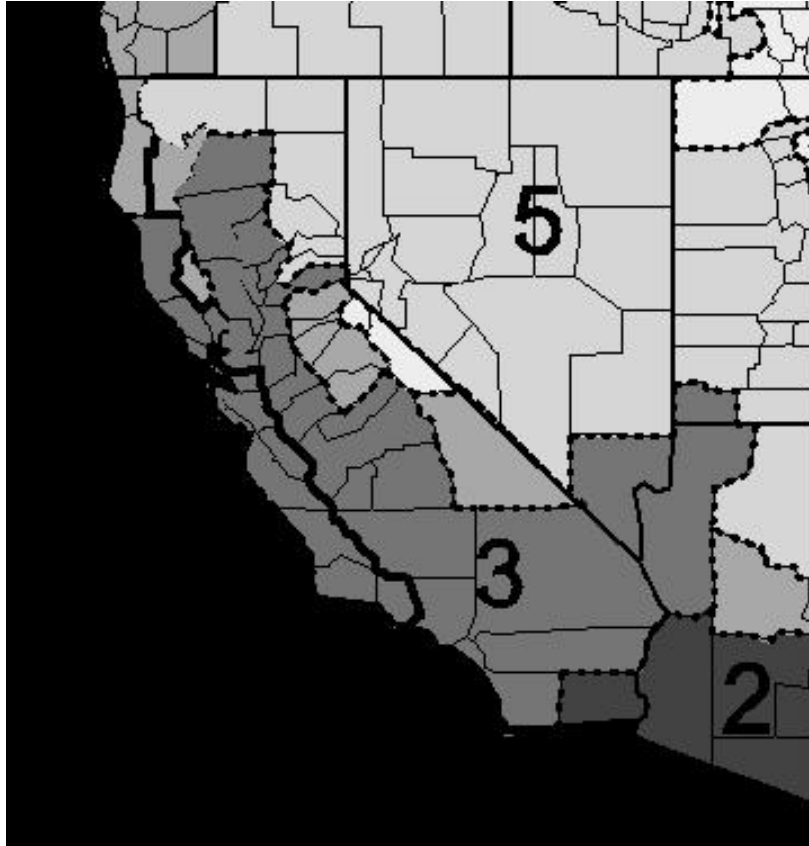
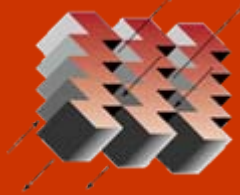
- The proposed changes are cost effective. See Analysis and Results section.

● Analysis Tools

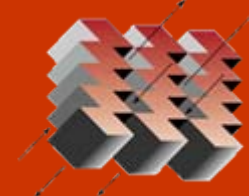
- Opaque door U-factor requirements and WLHP controls are prescriptive measures and the standard design modeling assumptions must be updated to incorporate these measures. The proposed prescriptive measures can be modeled by the reference method.



ASHRAE vs. California Climate Zones



California vs. ASHRAE Life-Cycle Cost Criteria



Term	15-Year Time Horizon (Envelope Measures) (\$/kBtu)	30-Year Time Horizon (HVAC Measures) (\$/kBtu)	Notes
CEC Present Value	0.0844	0.1460	Present value per unit of TDV energy savings over the life of the measure.
ASHRAE Present Value (Electricity)	0.0291 (34% of California)	0.0291 (20% of California)	Present value per unit of TDV energy savings over the live of the measure used by ASHRAE for the purposes of cost effectiveness. This represents the present value of electricity savings.
ASHRAE Present Value (Gas)	0.0448 (53% of California)	0.0448 (31% of California)	Present value per unit of TDV energy savings over the live of the measure used by ASHRAE for the purposes of cost effectiveness. This represents the present value of gas savings.

