# Proposal Summary

## Enhanced Dedicated Outdoor Air Systems (DOAS)

Updated September 8, 2025

Prepared by: Alamelu Brooks (Energy Solution)

# Measure Description

This measure seeks to establish mandatory and prescriptive requirements for smart DOAS in non-residential new construction and additions and alterations, aligning with national best practices.

The measure package consists of four sub-measures that would apply to Section 120.1(d) and Section 140.4(p) as described below.

The proposal would add the following mandatory requirements:

1. Require all DOAS systems to include an air valve with Air Flow Measurement System (AFMS) per thermal zone to modulate and/or shut off flow at each thermal zone required to have DCV or occupied standby, while still maintaining required ventilation to all zones served by the system.
2. Clarify where Occupied Standby is currently required in Section 120.1(d)5A.

The following prescriptive requirements are proposed:

3. Require VFD fan instead of 3-Speed fan to facilitate variable flow control in addition to system balancing.
4. Revise the Supply Air Temperature (SAT) from current 60°F to a lower temperature, e.g., 55°F to save energy. The measure applies to DOAS with cooling, heating (direct and or heat recovery) and ventilation, which serves multiple zones. This aligns with ASHRAE TC 1.4's current DOAS RP-1865.

These measures are applicable to new construction, additions, and alterations (system replacements and new installations only) in climate zones where proven cost-effective.

Table 1 summarizes the scope of the proposed code change.

### Table 1: Scope of Proposed Code Change

An “X” indicates the proposed code change is relevant.

| | | | | | |
|---|---|---|---|---|---|
| **Building Type(s)** | | single family | **Construction Type(s)** | X | new construction |
| | | multifamily | | X | additions |
| | X | nonresidential | | X | alterations |
| **Type of Change** | X | mandatory | **Updates to Compliance Software** | | no updates |
| | X | prescriptive | | X | update existing feature |
| | | performance | | X | add new feature |
| **Third Party Verification** | X | no changes to third party verification | | | |
| | | update existing verification requirements | | | |
| | | add new verification requirements | | | |

# Justification for Proposed Change

A DOAS is an energy-efficient HVAC system that maintains indoor air quality by bringing fresh air into interior spaces and handling ventilation independently from heating or cooling. Unlike typical rooftop units that mix large portions of return air with outdoor air, it brings in a dedicated supply of fresh outdoor air, dehumidifies it, conditions it, and then delivers at the right temperature and humidity to occupied spaces, decoupling the latent loads from sensible loads.

Smart DOAS incorporates into existing acceptance testing and automatically complies with both the demand control ventilation (DCV) and energy recovery requirements. It uses Variable Frequency Drive (VFD) fans to precisely match ventilation demand, and leverages energy recovery ventilators to precondition the incoming air – reducing cooling and heating loads.

This proposal seeks mandatory requirements to include air valves for all DOAS systems. Some DOAS designs do not have outlets for each thermal zone, just one outlet for several thermal zones. This does not meet the T24 ventilation requirements. Adding air valve not only complies with Occupied Standby but also saves energy and improves IAQ by dynamically ventilating the zones as needed.

The proposal also seeks to clarify the code language in section 120.1(d). This will expand the occupied standby control requirements to non-mandated zones when they are scheduled to be occupied but unoccupied.

Space decoupled ventilation systems (e.g., DOAS) serving spaces required to have occupant sensing ventilation controls shall include modulating pressure independent air valves or other means of modulating outside air at all space conditioning zones. This shall be done to disable ventilation to unoccupied zones while maintaining measured outside air ventilation rates to occupied zones within 10% of the design minimum outside air ventilation rate per 120.1(f)2 and shall include demand ventilation controls for high-density spaces per 120.1.(d)3.

Both these sub measures offer the potential for significant energy savings.

The sub-measure 3 of “Expand Variable Speed DOAS” is a prescriptive measure that proposes to replace the current 3-speed fan requirement with a Variable Frequency Drive (VFD) to provide more precise ventilation and airflow management. This will reduce energy consumption and fine-tune the total airflow based on the individual zone requirement, which may consequently result in cooling and heating savings.

Requiring the DOAS system to be a variable air volume (VAV) could reduce energy consumption, in addition to providing system balancing and reducing stress on motors and other components during startup and operation.

The sub-measure 4 proposes to reduce the DOAS supply air temperature (SAT) from current 60ºF under heating or heat recovery mode to 55°F when most zones require cooling. This will result in energy savings as allowing warmer air to enter the space will increase the energy for the space cooling equipment. The current 60°F was based on ASHRAE 90.1 Section 6.5.2.6, which was arbitrarily chosen. ASHRAE TC1.4 has completed a research project (DOAS RP-1865: Optimizing Supply Air Temperature Control for Dedicated Outdoor Air Systems) on revising the SAT. Tentatively, the CASE team proposes 55°F to estimate the preliminary analysis. The final proposal will be revised based on the outcome of the RP-1985 voting.

The proposed recommendations will reduce the fan energy at part load, improve indoor air quality, eliminate or reduce recooling energy of warm ventilation air when the majority of the zones call for cooling, and reduce ventilation system cooling and heating energy for all zones

# Data Needs / Information Requests

The Statewide CASE Team is seeking the following information to inform the code change proposal. Data may be provided anonymously. To participate or provide

information, please email [abrooks@energy-solution.com] directly and copy info@title24stakeholders.com.

- California specific market information on technical feasibility, site date, and workforce
- Installed DOAS units with VFD fans across Non-residential buildings in California
- Air valves with AFMS market availability and adoption data
- Projected demand for new units to be installed for new construction and additions
- Workforce availability and training needs
- Equipment lifetime for DOAS, VFD fans, and ERV wheels
- First cost and maintenance costs of DOAS, VFD fans, air valves etc.
- Costs by a mechanical contractor and a controls contractor
- Concentration of constant volume, 3-speed and variable speed drives
- Current design practices on SAT
- Real DOAS designs for different building types and sizes (large office, small office, K-12, assembly, etc.)
- Realistic load profiles and schedules for various building types

# Draft Code Language

## 1.1 Guide to Marked Up Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2025 documents are marked with blue underlining (new language) and ~~strikethroughs~~ (deletions).

## 1.2 Title 24, Part 1

There are no proposed changes to Title 24, Part 1.

## 1.3 Title 24, Part 6

**DOAS Occupied Standby Control**

**Section 120.1(d)5A (iii):** Space conditioning zones shall include occupied standby controls complying with Section 120.1(d)5B when all of the following are true:

i. All rooms served by the zone are permitted to have their ventilation air reduced to zero while in occupied-standby mode per Table 120.1-A; and

ii. Occupant sensors are required by Section 130.1(c)5, 6 and 7; and

iii. The zone and ventilation system is not served by pneumatic controls.

Spaces meeting these criteria include, but not limited to:

Post-secondary classrooms and lecture halls

Conference, meeting, and training rooms

Multipurpose rooms < 1,000 ft2

Breakrooms

Enclosed offices and open plan office areas

Corridors and stairwells

**Air Valves**

**Section 120.1(d)5B(viii):** Space decoupled ventilation systems (e.g. DOAS) serving spaces required to have occupant sensing ventilation controls shall include modulating pressure independent air valves or other means of modulating outside air at all space conditioning zones. This shall be done to disable ventilation to unoccupied zones while maintaining measured outside air ventilation rates to occupied zones within 10 percent of the design minimum outside air ventilation rate per 120.1(f)2 and shall include demand ventilation controls for high-density spaces per 1201.(d)3.

**3-Speed fan to VFD fan**

**Section 140.4(p)3:** DOAS supply and exhaust fans shall have a ~~minimum of three speeds to facilitate~~ VFD to facilitate variable flow control in addition to system balancing.

**Modify Supply Air Temperature**

**Section 140.4(p)4:** DOAS with mechanical cooling providing ventilation to multiple zones and operating in conjunction with zone heating and cooling systems shall not use heating or heat recovery to warm supply air above ~~60°F~~ 55°F when representative building loads or outdoor air temperature indicates that the majority of zones require cooling.

## 1.4 Reference Appendices

Functional testing will be modified in NA 7.5.4.2.