DOCKETED	
Docket Number:	25-BSTD-03
Project Title:	2028 Energy Code Pre-Rulemaking.
TN #:	271537
Document Title:	HVAC Return Plenums Final CASE Team Comment Letter
Description:	Final CASE Team Comment Letter - Summarizing IAPMO Smart Return Plum Proposal and Resolution
Filer:	Michael Shewmaker
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	7/17/2026 2:42:25 PM
Docketed Date:	7/17/2026

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

COMMENT LETTER SUMMARIZING IAPMO SMART RETURN PLENUM PROPOSAL AND RESOLUTION

July 17, 2026

California Energy Commission

Docket No. 25-BSTD-03

The California Statewide Codes and Standards Enhancement (CASE) initiative presents recommendations to support the California Energy Commission's (CEC's) efforts to enhance California's Energy Code (Title 24, Part 6). Three California Investor-Owned Utilities (IOUs) — Pacific Gas & Electric Company, San Diego Gas & Electric, and Southern California Edison sponsored this effort as a group.

This letter summarizes recent Statewide CASE Team engagement with the International Association of Plumbing and Mechanical Officials (IAPMO) Uniform Mechanical Code (UMC) regarding the attempt to ban return plenums of nonresidential air distribution systems led mainly by the International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART). The model code that informs Title 24 Part 4 (the California Mechanical Code or CMC) is the UMC, which is maintained by IAPMO. This means that changes to the UMC would be likely to subsequently become an issue for the CMC.

Return plenums are more energy efficient and less costly than a fully ducted return. The outcome of the SMART-led effort to limit return plenums would have been increased energy use and more expensive buildings in California.

Though this effort appears to have failed for the 2027 cycle, the intent of providing these comments is to document the events that took place and provide some recommended next steps to guard against this issue arising again in the future.

Recap of Events

A return plenum is an open cavity above occupied space that provides an efficient and affordable design option that allows air to make its way back to central air handling

equipment prior to filtration, conditioning, and recirculation or exhaust. This option is nearly the universal choice in commercial buildings due to its efficiency and cost benefits to owners. In 2024 and 2025, the IAPMO Mechanical Technical Committee (TC) entertained a proposal spearheaded by SMART to prevent return plenums from being allowed in the 2027 edition of the UMC. As noted above, California's Title 24 Part 4 is based on the UMC, so this proposal was very concerning to the Statewide CASE Team as it would result in increased energy use. In January 2025, the CASE Team docketed comments with IAPMO opposing this proposal. Later in 2025, when it appeared that this proposal may succeed, the Statewide CASE Team sent a representative to speak at the IAPMO annual meeting in Palm Springs, CA in September 2025 to object to this proposal. Unfortunately, at that time, the CASE team representative was joined by only one other voice in opposition, whereas SMART mustered several hundred members for the event, all of whom voted in favor. The proposal was adopted by an overwhelming vote in favor.

However, the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) filed an appeal, which IAPMO accepted in November 2025. The appeal references existing peer-reviewed ASHRAE research which shows plenum return systems reduce energy costs. Dramatically, the sheet metal union persisted and tried to get the appeal decision overturned with IAPMO, but that attempt was finally put to rest in February 2026 and appears to be final. The 2027 edition of the UMC will not have a ban on return plenums. However, the degree of persistence of the sheet metal union has convinced the Statewide CASE Team that proactive steps should be taken to ensure that Title 24 Part 6 explicitly allows return plenums given that special interests are likely to try this again in the 2030 edition.

Technical Background

In commercial applications with steel and concrete structures, plenum returns are common and they have been used without any known health and safety issue for multiple decades.[1] Unducted return air systems can use ceiling plenums (i.e., a concealed space) or occupied space (i.e., an unconcealed space) to return air to a central air handling unit. The proposal that was promoted by SMART would have eliminated the use of concealed spaces for return air; using occupied spaces to create a

[1] The Statewide CASE Team conducted secondary research to determine which option is more common (i.e., ducted or plenum). The research was inconclusive since no authoritative study has been conducted. However, research did indicate that return plenums are a widely accepted and utilized option.

return path would have still been possible. In most applications in commercial buildings, this would require the use of corridors to connect multiple spaces but note that corridors shall not be used as return ducts per UMC Section 602.7. This ultimately leaves no other option than a fully ducted return system in most cases.

In all cases, fully ducted return systems use more energy and are more expensive to construct compared to unducted plenum returns. Therefore, the SMART-led ducted return proposal would increase energy use and installation costs for a substantial percentage of commercial buildings with no known health or safety benefit by disallowing the use of plenums for return air. The 2015 *ASHRAE Journal* article titled "Return Air Systems" compares architectural return air plenums to ducted return systems.[2]

As the article outlines, the relevant benefits of using a plenum return air system are 1) reduced fan energy costs of about 20% to 30% due to the much lower pressure drop of the plenum return system, and reduced fan energy in systems with outdoor air or relief fans in lieu of less efficient return fans, which are generally required when return air is fully ducted, and 2) reduced HVAC system costs of about $3 to $5 per square foot [in 2015 dollars], about 10% to 20% of the total HVAC system cost.

The article also addresses potential indoor air quality issues related to humidity and dust/particles in the plenum. Per the article, issues with humidity "can be avoided by simply not allowing the architectural plenums to become negatively pressurized relative to outdoors" which is easily achievable during design and implementation with modern building automation systems to operate at near neutral pressure. The article also notes that "a ceiling return air plenum that has been used for a few years could have substantial dust accumulation on plenum surfaces. But return air ducts could have a similar or even thicker layer of dust. The dust "challenge" for both are particles drawn from the conditioned space and the source strength of these particles is the same whether the return air is ducted or an architectural plenum. In both cases, the air will be filtered at the air handler before the recirculated air is supplied to the space, so in both cases, this is generally a non-issue from an indoor air quality perspective. Particle challenges from outdoor ventilation air are usually much greater."

Additionally, the article highlights adverse impacts on the building design related to the need to increase the space between floors or drop ceilings to accommodate ductwork, not only impacting the costs to the HVAC system but also additional materials (and hence costs) to the building envelope. There is also a potential for impact to the

---

[2] https://tayloreng.egnyte.com/dl/pOvL4Y6Gpl/ASHRAE_Journal_-_Return_Air_Systems.pdf_.

plumbing and sprinkler piping (i.e., an increase in cost and design complexity), and adding the need for balancing contractors.

Another paper, "Impact of Air Return Strategy on Building Energy Consumption And Indoor Air Quality" from the National Center for Energy Management and Building Technologies found that ducted return "consumed on average roughly 7.5%" more fan energy than plenum return systems and detailed modeling and field testing refuted the notion that indoor air quality was negatively affected by use of return air plenums.[3]

Recommended Next Steps

- One of the key next steps within the IAPMO process has been the establishment of a working group that would study this issue and develop data driven recommendations that balance IAQ, safety, cost, and efficiency for buildings. The CASE Team is considering joining this working group to ensure a balanced membership and that energy efficiency is a priority. The CEC and/or Building Standards Commission (BSC) could consider joining the working group as well if desired.
- The CEC may consider the merits of arranging a briefing meeting between the CASE Team and the BSC to fully inform the BSC of the nature of current rules proposals.
- The CASE Team will consider developing a 2031 Title 24 Part 6 measure that would require plenum returns in Part 6 in situations where this feature is determined to be cost effective and not impact occupant safety or IAQ. An initial draft of code markup language is provided below. Please note that this language is not being proposed for the 2028 cycle but rather is being shown for reference. If this measure is pursued in the 2031 cycle, a full cost-effectiveness analysis would be conducted to determine whether the measure is viable.

Proposed Code Language

Section 201 – DEFINITIONS

---

3 https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=4619eaf3d4bcae7abb28a933ff4ffeea5f4dd299.

…

DUCT, AIR is a tube or conduit, typically constructed of sheet metal (steel or aluminum), plastic (including flexible plastic), and fiberglass/fiberboard, used to convey air.

RETURN, DUCTED is when return air travels from zones back to air handling systems through air ducts.

RETURN, PLENUM is when return air from zones travels back to air handling systems through concealed and/or unconcealed building spaces, such as ceiling plenums and drywall shafts.

…

Section 401.2.4 *[Section 120.4]* **Requirements for air distribution system ducts and plenums.**

…

401.2.4.8 Plenum Return.

Plenum returns shall be designed and controlled so that plenums exposed to exterior walls or roofs are maintained at a positive pressure relative to the outside in climates where the ASHRAE 2% annual dehumidification design dewpoint temperature exceeds 60°F (16°C).

401.2.4.8.1 Non-residential buildings over 5,000 ft2

Return air paths in non-residential buildings over 5,000 ft2 shall use *plenum return* and shall not use *ducted return.*

Exception to Section 401.2.4.8.1: Building types or buildings with the following characteristics listed below are not required to use *plenum returns*:

1. *Healthcare facilities*
2. Laboratories
3. Concealed building spaces constructed of combustible materials
4. *Air ducts* in vertical shafts
5. Transfer *air ducts* from one plenum or space to another, such as those used for acoustic attenuation, to cross rated corridors, or to pass through full height walls.

401.5 *[Section 141.0]* Additions and alterations to existing buildings.

401.5.1 *[Section 141.0]* Additions.

…

401.5.1.1 *[Section 141.0(a)]* Mandatory requirements (Additions).

Any newly installed *space-conditioning system* shall meet the applicable requirements of the sections listed below:

101 *[Section 100.0(h), 110.0, 110.1, 110.5]* Systems and Equipment

400.2, 400.3, 400.4.4, 400.5, 401.1, 401.2 *[Section 110.2, 110.5, 110.8(d)3, 120.0 through 120.5, 120.9, 120.10]* Mandatory Requirements for HVAC Systems

400.6 *[Section 110.12]* Mandatory Requirements for Demand Management

Exception 1 to Section 401.5.1.1: Duct Sealing. When ducts are extended from an existing *duct system* to serve the *addition*, the existing *duct system* and the extended ducts shall meet the applicable requirements specified in Section 401.5.2.2.4 *[Section 141.0(b)2D]*.

Exception 2 to Section 401.5.1.1: Additions to a non-residential building with an existing *ducted return* shall not be required to meet the requirements specified in Section 401.2.4.8.1.

…

401.5.2 *[Section 141.0(b)]* Alterations.

…

401.5.2.1 *[Section 141.0(b)1]* Mandatory requirements (Alterations).

Altered components in a *nonresidential*, or *hotel/motel building* shall meet the requirements specified in the sections listed below that are applicable to the *building* project and the minimum requirements in Section 401.5.2.1.1.

Covered process requirements for *alterations*, and *repairs* to existing *nonresidential*, and *hotel/motel buildings* are specified in Subchapter 9 *[Section 141.1]*.

101 *[Section 100.0(h), 110.0, 110.1, 110.5]* Systems and Equipment

400.2, 400.3, 400.4.4, 400.5, 401.1, 401.2 *[Section 110.2, 110.5, 110.8(d)3, 120.0 through 120.5, 120.9, 120.10]* Mandatory Requirements for HVAC Systems

400.6 *[Section 110.12]* Mandatory Requirements for Demand Management

Exception 1 to Section 401.5.2.1: The requirements of Section 401.2.2.9 *[Section 120.2(i)]* shall not apply to *alterations* of *space-conditioning systems* or components.

Exception 2 to Section 401.5.2.1: Alterations to a non-residential building with an existing *ducted return* shall not be required to meet the requirements specified in Section 401.2.4.8.1.