STATE OF CALIFORNIA
GOVERNMENT OPERATIONS AGENCY
CALIFORNIA BUILDING STANDARDS COMMISSION
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Office Use Item No. _____

PARTICIPATION COMMENTS FOR THE NOTICE DATED OCTOBER 9, 2015
Written comments are to be sent to the above address.

WRITTEN COMMENT DEADLINE: NOVEMBER 23, 2015 (no later than 5:00 pm)

Date: 10/21/2015

From:

Shlomo Rosenfeld, PE — Shlomo Rosenfeld
Name (Print or type) — (Signature)

Shlomo I. Rosenfeld & Associates
Agency, jurisdiction, chapter, company, association, individual, etc.

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I/We do not agree with:

[ ] The Agency proposed modifications As Submitted on Section No. 407.4.1.4

and request that this section or reference provision be recommended:

[ ] Approve [ ] Disapprove [X] Further Study [ ] Approve as Amended

Suggested Revisions to the Text of the Regulations:

407.4.1.4 *No space above a ceiling may be utilized as an outside-air, relief-air, supply-air, exhaust-air, or return-air plenum.*

Exceptions:

(1) Designs specifically approved by the enforcing agency.

(2) Return air plenums shall be permitted for ***[OSHPD 3]*** *provided that applicable spaces listed in Table 4A that have required pressure relationships shall be served by fully ducted supply, return, and exhaust systems. The following additional surgery and critical-care patient-care areas that do not require a pressure relationship shall also be served by fully ducted supply, return, and exhaust systems: 1) Recovery rooms, and 2) Treatment rooms.*

In facilities that treat inpatients, mechanical systems shall only utilize fully ducted systems for supply, return, and exhaust air.

…

Reason: [The reason should be concise if the request is for "Disapprove," "Further Study Required," or "Approve As Amended" and identify at least one of the 9-point criteria (following) of Health and Safety Code §18930.]

1. General

   The proposed Plenum Return Air in Certain Areas of OSHPD 3 Clinics is a very important issue, which, if done without further study and proper evaluation, may result in un-intendent consequences. Over 40 years ago I designed a medical facility with return air plenum where it was permitted. Thus, I have learned from this experience and many others non OSHPD-3 clinics experiences as demonstrated below.

   There are many existing clinics in California with return air ceiling plenum. This allows for independent study sponsored by OSHPD for proper evaluation prior to adopting the proposed exception for Sec. 407.4.1.4.

2. Return air ceiling plenum

   2.1. The only reason to use return air ceiling plenum is to attempt to reduce the project initial cost.-$$

   2.2. There is not one type of return air ceiling plenum.

   2.3. Each return air ceiling plenum is geometrically different therefore, the air flow patterns and air pressure within the plenum are unique to each plenum. (*S).

      2.3.1. What may appear to perform in one case may not perform in another case. (*S)

      2.3.2. What may appear to perform at one point in time may not perform at another time in the same plenum. (*S)

   2.4. The pressure at each part of the return air ceiling plenum is slightly different from other parts and it is **variable** subject to activity and usage of the occupied space below. (*S)

      2.4.1. Opening and closing doors in the occupied space changes the air flow patterns in the occupied space and in the return air ceiling plenum and associated pressure within the return air ceiling plenum above individual rooms associated and not associated with the activity and usage. (*S)

   2.5. Return air ceiling plenum is an acoustics short link between rooms and is a speech privacy concern in medical facilities. (*S)

      2.5.1. It is traditionally overcome by extending the acoustical partitions to the floor above and providing acoustically treated transfer openings for return air. This increases the initial cost. +$$. The end result is multiple compartments of the plenum. Again each return air ceiling plenum is geometrically different and the air flow patterns and pressure within the plenum are unique to each one. (*S)

   2.6. Rated partitions in return air ceiling plenum with return air transfer opening are another example of the geometrical differences and thus the air flow patterns and pressure within the plenum are unique to each one. (*S)

   2.7. The location of the main return air duct opening in the return air ceiling plenum. The pressure at the location of the main return air duct opening at the return air ceiling plenum will be the lowest pressure in the plenum. Rooms under the main return air duct opening experience higher return air flow as compared to rooms further from the main return air duct opening. (*S)

      2.7.1. In one case a procedure room was located right under the return air main duct connection to the plenum. When the procedure room door was opened air from the corridor was rushing through the procedure room and its ceiling grilles to the return air ceiling plenum. This could contaminate the procedure room since the door could be opened even during a procedure when equipment is needed.

3. Positive pressure rooms. The return air ceiling plenum above a positive pressure room is in negative pressure. Therefore, air could be pulled by the lower pressure in the return air ceiling plenum from the positive pressure room.

   3.1. The positive pressure room return air is ducted and does not have return air transfer grills to the return air ceiling plenum. It is balanced at the end of the project construction. Thus assuming that there is no

flow from the positive pressure room to the return air ceiling plenum. However, the positive pressure room ceiling is not sealed, the light fixtures are not sealed, public address devices are not sealed, sprinkler pipe penetrations are not sealed, and more. The balancer records the ducted supply cfm and the ducted return cfm but does not record the leakage through the ceiling leaving the question is the room really positive. As stated above, the pressure at each part of the return air ceiling plenum is slightly different from other parts and it is variable. When the door in the positive pressure room is opened it is expected, in many cases, for the air from the corridor to rush through the positive pressure room and the unsealed openings listed above to the negative return air ceiling plenum and potentially contaminating the positive pressure room. (*S).

3.2. If the proposed text is approved, the code should include a requirement to seal the ceiling, light fixtures, public address devices, sprinkler pipe penetrations, etc. in positive pressure rooms. However, once the ceiling is accessed, it may not be sealed again.+$$.

3.3. If the proposed text is approved, the code should require to install the partitions of positive pressure rooms up to the floor above and to seal them and all penetrations. However, once the ceiling is accessed, the partitions may not be sealed again.+$$.

3.4. This reduces the anticipated initial cost savings. +$$.

3.5. Leakage rate should be established and a process describing how the leakage rate will be enforced should be established.+$$, (*S).

4. Negative pressure rooms. The return air ceiling plenum or part of it above a negative pressure room could be in more negative pressure than the negative pressure rooms below the return air ceiling plenum. Therefore, air could be pulled by the lower pressure in the return air ceiling plenum from the negative pressure room. (*S)

4.1. The common assumption is that the negative pressure rooms are ducted to exhaust and do not have return air transfer grills to the return air ceiling plenum. Thus, assuming that there is no flow from the negative pressure room to the return air ceiling plenum. However, the negative pressure room ceiling is not sealed, the light fixtures are not sealed, public address devices are not sealed, sprinkler pipe penetrations are not sealed, and more. As stated above, the pressure at each part of the return air ceiling plenum is slightly different from other parts and it is variable. When the door in the negative pressure room is opened it is expected, in many cases, for the air from the corridor to rush through the negative pressure room and the unsealed openings listed above to the return air ceiling plenum and potentially contaminating the return air system. (*S)

4.2. If the proposed text is approved, the code should include a requirement to seal the ceiling, light fixtures, public address devices, sprinkler pipe penetrations, etc. in negative pressure rooms. However, once the ceiling is accessed, it may not be sealed again.

4.3. If the proposed text is approved, the code should require to install the partitions of negative pressure rooms up to the floor above and to seal them and all penetrations. However, once the ceiling is accessed, the partitions may not be sealed again. +$$.

4.4. This reduces the anticipated initial cost saving. +$$.

4.5. Leakage rate should be established and a process describing how the leakage rate will be enforced should be established. +$$, (*S).

5. Rooms that do not require pressure relationship: The propose exception requires fully ducted return air for the following rooms: (1) Recovery rooms, (2) Treatment rooms. The same situation as described above for negative and positive rooms is expected in recovery and treatment rooms.

5.1. If this proposed text is approved, the code should include a requirement to seal the ceiling, light fixtures, public address devices, sprinkler pipe penetrations, etc. in recovery and treatment rooms. However, once the ceiling is accessed, it may not be sealed again.+$$.

5.2. If this proposed text is approved, the code should require to install the partitions of recovery and treatment rooms up to the floor above and to seal them and all penetrations in recovery and treatment rooms. However, once the ceiling is accessed, the partitions may not be sealed again.+$$.

5.3. This reduces the anticipated initial cost savings. +$$.

5.4. Leakage rate should be established and a process describing how the leakage rate will be enforced should be established. (*S)

5.5. Rooms that do not require pressure relationship but are not listed in the proposed exception are a concern as well. CMC Table 4-A note # 8 implies that room is in positive pressure when 25 cfm more supply air than exhaust/return air is provided. I assume that OSHPD does not allow rooms that do not require pressure relationship to be in positive pressure. This could not be avoided when return air ceiling plenum is used. (*S). The same analysis applies to room which is in negative pressure when 25 cfm less supply air than exhaust/return air is provided. I assume that OSHPD does not allow rooms that do not require pressure relationship to be in negative pressure. This could not be avoided when return air ceiling plenum is used. (*S).

6. Supply air impact. Since the pressure at each part of the return air ceiling plenum is slightly different from other parts and it is variable the pressure in the room below the ceiling could also be variable as well and subject to activity and usage of the occupied space. Variable pressure in the room may have an impact on the supply air volume to the room. (*S).

6.1. *The common reply is that with constant volume pressure independent terminal units used today this will not occur. However, one constant volume pressure independent terminal unit serving multiple rooms does not assure that constant flow to each of the rooms. It assures that the total flow is constant. Therefore, there could be variation in flow as a result of activity on the floor without varying the total flow out of the terminal unit.*

7. Variable air volume. Using VAV system in combination with return air ceiling plenum makes the situation much worse. There is no VAV control of the air leaving the room to the plenum, the pressure in the plenum is more variable and the impact of activity on the occupied floor on the flow patterns and the pressure in the plenum is increased. (*S).

8. Potential contamination of the return air ceiling plenum. We know that return air in medical facilities includes a lot of lint. Try to look inside an existing return air duct. If return air ceiling plenum is used, the lint and dust in the return air will collect in the return air ceiling plenum. We can imagine what is riding on the lint and dust in the return air of a medical facility. Do we want it collected in the return air ceiling plenum? (*S).

8.1. A few years back I was involved as part of a group in observing HVAC systems above the ceiling of a medical facility. We were ordered to view a long video about all the potential risks in sticking your head above the ceiling of the medical facility and asked to sign disclaimers regarding these risks. Keep in mind that this was not a return air ceiling plenum the return air was ducted in that facility. The risks of contamination of a return air ceiling plenum is much higher.

8.2. Remember the code requires that the top of cabinets in medical facilities are designed to minimize collection of dust. Do we want the dust above the ceiling?

9. The proposed exception includes ‘facilities that treat inpatients’. Having served on the California Hospital Building Safety Board for over 10 years, I remember OSHPD’s concerns about out-of-the-ordinary events and keeping the public best interest in mind OSHPD contemplated many considerations including impact on rural facilities.

9.1. Facilities that do not intend to treat inpatient during project design duration and includes a return air ceiling plenum may not be available to treat inpatients during epidemic or seismic event when qualified spaces could be short.

9.2. In campus medical facilities with inpatient and outpatient rooms, during remodeling or maintenance work in the inpatient facility rooms, the outpatient rooms with return air ceiling plenum, that do not

intend to treat inpatients during project design time, will not be available for inpatient treatment during the remodeling period.

9.3. During normal operations who is going to monitor or police the use of the rooms with return air ceiling plenum? Is OSHPD going to require a warning sign at the door?

10. Many of the items listed above make it very difficult for OSHPD to enforce the proposed regulation.
11. Since positive pressure rooms, recovery and treatment rooms return air is proposed to be ducted, the return air duct is not completely eliminated. This reduces the anticipated initial cost saving of the plenum. +$$.
12. The use of return air ceiling plenum above the top floor in any building is questionable due to the roof air leakage, heating and cooling loads and energy consumption. In many projects the return air is ducted at the top floors to avoid the roof air leakage, heating and cooling loads and energy consumption. It appears that this will be the same at OSHPD-3 projects. The top floor consideration diminishes the anticipated initial cost savings of the plenum. +$$.
13. Has anyone calculated the real anticipated initial cost saving by the return air plenum (including cost of acoustics, sealing of negative rooms ceiling, sealing of positive rooms ceiling, sealing of recovery and treatment rooms ceiling and considering that top floors may not use return air ceiling plenum) in OSHPD-3 clinics? (*S) $$. What is the real anticipated initial cost saving as a percentage of the total construction cost? There are no evidences that comprehensive cost to the public is reasonable, based on the overall risk and benefit to be derived from the proposed text as required by point 5 of 9. (*S) $$
14. Based on the above comments, it appears that the performance of a OSHPD-3 clinic building when designed based on the proposed text is potentially unpredictable or capricious contrary to point 4 of 9 requirements and could increase the risk to the public and staff.
15. Suggestion. There are many existing clinic buildings (non OSHPD-3) in California which were designed with return air ceiling plenum, with constant volume systems and VAV systems. My suggestion is that independent study sponsored by OSHPD will perform surveying, testing, monitoring of examples of existing clinic buildings before concluding that the use of return air ceiling plenum is appropriate as proposed. Studying the performance of existing real life clinic buildings in California will tell OSHPD more than I can tell or anyone else. The study should evaluate also the real cost saving of return air plenum including the issues described above. (*S) $$.

We should remember that the bitterness of poor performance of clinics with return air ceiling plenum, will linger long after the sweetness of the initial cost savings is forgotten.

(*S) = Items above which should be included in the suggested independent study sponsored by OSHPD are identified by (*S).
$$ = Issue related to the proposed return air ceiling plenum cost.

HEALTH & SAFETY CODE SECTION 18930

SECTION 18930. APPROVAL OR ADOPTION OF BUILDING STANDARDS; ANALYSIS AND CRITERIA; REVIEW CONSIDERATIONS; FACTUAL DETERMINATIONS

(a) Any building standard adopted or proposed by state agencies shall be submitted to, and approved or adopted by, the California Building Standards Commission prior to codification. Prior to submission to the commission, building standards shall be adopted in compliance with the procedures specified in Article 5 (commencing with Section 11346) of Chapter 3.5 of Part 1 of Division 3 of Title 2 of the Government Code. Building standards adopted by state agencies and submitted to the commission for approval shall be accompanied by an analysis written by the adopting agency or state agency that proposes the building standards which shall, to the satisfaction of the commission, justify the approval thereof in terms of the following criteria:

(1) The proposed building standards do not conflict with, overlap, or duplicate other building standards.

(2) The proposed building standard is within the parameters established by enabling legislation and is not expressly within the exclusive jurisdiction of another agency.

(3) The public interest requires the adoption of the building standards.

(4) The proposed building standard is not unreasonable, arbitrary, unfair, or capricious, in whole or in part.

(5) The cost to the public is reasonable, based on the overall benefit to be derived from the building standards.

(6) The proposed building standard is not unnecessarily ambiguous or vague, in whole or in part.

(7) The applicable national specifications, published standards, and model codes have been incorporated therein as provided in this part, where appropriate.

(A) If a national specification, published standard, or model code does not adequately address the goals of the state agency, a statement defining the inadequacy shall accompany the proposed building standard when submitted to the commission.

(B) If there is no national specification, published standard, or model code that is relevant to the proposed building standard, the state agency shall prepare a statement informing the commission and submit that statement with the proposed building standard.

(8) The format of the proposed building standards is consistent with that adopted by the commission.

(9) The proposed building standard, if it promotes fire and panic safety as determined by the State Fire Marshal, has the written approval of the State Fire Marshal.