American Commissioning Group, LLC

October 5, 2009

To Whom It May Concern:

Subject: DRAFT Cal Green Building Code

As a Professional Mechanical Engineer, a Certified Commissioning Agent and a LEED AP, I am forwarding some comments on the proposed draft Cal Green Building Code requirements.

5.504. IAQ Post-construction. After all interior finishes have been installed; flush out the building by supplying continuous ventilation with all air handling units at their maximum outdoor air rate and all supply fans at their maximum position and rate for at least 14 days.
1. During this time, maintain an internal temperature of at least 60 °F, and relative humidity no higher than 60%. If extenuating circumstances make these temperature and humidity limits unachievable, the flush out may be conducted under conditions as close as possible to these limits, provided that documentation of the extenuating circumstances is provided in writing.
2. Occupancy may start after 4 days, provided flush-out continues for the full 14 days. During occupied times, the thermal comfort conditions of Title 24 must be met.
3. For buildings that rely on natural ventilation, exhaust fans and floor fans must be used to improve air mixing and removal during the 14-day flush out, and windows should remain open.
4. Do not "bake out" the building by increasing the temperature of the space.
5. If continuous ventilation is not possible, flush-out must total the equivalent of 14 days of maximum outdoor air.

Following are comments on the currently considered language for the 2010 revision to the California Green Building Code;

Comments

1. There are certain risks to the mechanical equipment if this procedure is mandated. First, damage may occur to ductwork in VAV systems during flushing because the fans are set to run at maximum capacity regardless of the need of the system. It is impossible to reach 60°F in warmer climates. Most of the cooling equipment is not designed to do it. If heating is done at the VAV zones and not at the AHU (no preheat coil), then freezing of the chilled water coil may be an issue in cold climates.

2. Two of the criteria points seem to be mutually exclusive:

   "… supplying continuous ventilation with all air handling units at their maximum outdoor air rate and all supply fans at their maximum position and rate for at least 14 days"

   - and

   "…During this time, maintain an internal temperature of at least 60 °F, and relative humidity no higher than 60%"

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Please note that it is not a recommended practice to interfere with the control of the supply fans and outdoor air intake rates directly. To do this runs the risk of possible system damage by freezing, excessive down-stream duct pressures and possible collapse of the air intake plenums. Controlling the equipment as a system is the recommended approach by establishing sequence modes that operate the equipment properly and safely.

3. The cost of this testing done during the height of summer in Bakersfield or the dead of winter in Mammoth could be a burden on the construction budget or at minimum, a substantial energy consumer.

4. The control of humidity would be very difficult during this testing, especially during "occupied" hours. There is usually no provision in HVAC equipment for controlling humidity directly as the cooling coil accomplishes it indirectly. A better measure of this variable might be Dewpoint and not relative humidity. The dewpoint temperature tells something about moisture content in the air independent of dry-bulb temperature. To deal with it, the AC systems have to run with full refrigeration on to cool the air to the desired dewpoint temperature [because that is the only means of humidity control], so the AC systems have to have the capacity to accomplish this at weather extremes, and they usually do not.

5. During this 14 day period, (especially if occupancy is begun on the 4th day) uniform T24 space temperatures cannot be achieved in all weather cases because the AC systems are not designed to operate with 100% Outside Air during peaked weather conditions. This requirement needs to be revised to be achievable. Also, "the equivalent of 14 days of maximum outdoor air" needs a definition. What is equivalent?

Recommendations

VOCs off-gas slowly from new materials and the idea is to purge these gasses as they decay during the first few months of building occupancy. The LEED V3 flushing requirements are based upon total cubic feet of OSA per SF of building space and are intended to be performed over several weeks. This seems to be the more logical approach for determining the required purge rate or number of air changes required in a newly constructed space. Testing the air for maximum concentration of contaminants is also a good option to include in the new code, since this allows a contractor some options to meet construction schedules and/or costs constraints.

For example, operating a system in the minimum OA intake mode with the general exhaust fans on and the zones set for about 70% of design maximum airflow should be more than enough air movement through a building to purge the decaying VOCs while maintaining the specified occupant comfort conditions within the constraints of a standard AC system. The period of the flush would be calculated by the total required cubic feet of OSA per square foot. The proof of continuous system operation at minimum OA intake might simply become a history trend of the OA intake volume (CFM) over the specified time span as mandated for new systems meeting T24.

Conclusion

The proposed language is confusing and will be difficult to enforce. We recommend closer compliance with the LEED V3 requirements as they already have a successful implementation record in the field.

Sincerely,

Anton N. Paley, PE, CxA, LEED AP