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**Multifamily Restructuring Proposals for 2022 - Space Conditioning  
â€“ Duct Leak Testing**

*Additional submitted attachment is included below.*



Regarding:  
2022 Energy Code  
Multifamily Restructuring Proposals for 2022  
Space Conditioning – Duct Leak Testing

On December 2<sup>nd</sup>, 2020, Multifamily Restructuring Proposals for 2022 were presented at the 2022 Pre-Rulemaking for Building Energy Efficiency Standards, including a proposal for extending the mandatory Duct Leak Testing requirements currently applicable to multifamily buildings three habitable stories or less to also include multifamily buildings four habitable stories or greater. NEMIC supports the expansion of duct leak testing to multifamily buildings four habitable stories or greater, but strongly disagree that the requirements currently applicable to multifamily buildings three habitable stories or less are appropriate for larger buildings. For larger multi-family buildings, more reliable duct leak testing methodology should be required and certifications or other workforce standards should be required for the technician performing the work.

Currently, multifamily buildings three habitable stories or less are required to comply with RA3.1.4.3 Diagnostic Duct Leak Testing<sup>1</sup>. This method appears to be derived from ASTM E 1554-07 Standard Test Methods for Determining Air Leakage of Air Distribution Systems by Fan Pressurization<sup>2</sup> – Test Method D. This method has multiple limitations that render it unreliable. These limitations include:

- Per the RA3.1.4.3 method, duct leakage is estimated by using a percentage of measured leakage in comparison to the design airflow of the system. The percent of design airflow is an arbitrary assignment and does not take into account the expected leakage rate of all components of a system. The accuracy of this method can vary widely depending on the system and the quality of the installation of the various components.
- Furthermore, this method tests the systems at 25 Pascals (0.1 in. water), which is significantly below normal operating pressures. Leakage is a function of pressure<sup>3</sup> and therefore testing a system below the normal operating pressure will not provide an accurate depiction of actual duct leakage during normal operation.

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<sup>1</sup> *2019 Reference Appendices: For the 2019 building energy efficiency standards: Title 24, Part 6, and associated administrative regulations in part 1.* (2018). Sacramento, CA: California Energy Commission.

<sup>2</sup> *Standard test methods for determining air leakage of air distribution systems by fan pressurization.* (2013). West Conshohocken, PA: ASTM International.

<sup>3</sup> *Investigation of Duct Leakage - ASHRAE RP-308.* (1985). ASHRAE.



- Per RA3.1.4.3.6 altered existing ducts that fail the leakage test can perform a smoke test and visual inspection to confirm accessible leaks have been sealed. Smoke tests, however, are notoriously subjective and are dependent on the location of the viewer.

RA3.1.4.3 is also problematic because it fails to require any training or certification for the technician performing the duct leak test. In order to be reliable and accurate, a Duct Air Leakage test must be performed by a properly skilled, trained, and certified technician.

- ASTM E 1554-07 Standard, Section 1.5, states that “The proper use of these test methods requires knowledge of the principles of air flow and pressure measurements”. This required knowledge base cannot be gained and verified through a weeklong course and examination. For larger buildings where greater energy savings are at stake, the Commission should require duct leak testing to be performed by a Mechanical Acceptance Test Technician, who is also a technician certified as a Testing, Adjusting, and Balancing Technician (AABC, NEBB, or TABB) or as a Duct Air Leakage Technician by the International Certification Board (ICB).
- This would be consistent with the CEC’s requirement to use certified Mechanical Acceptance Test Technicians to perform HVAC system acceptance testing in nonresidential buildings.<sup>4</sup> The CEC imposed a certification requirement as a result of the September 2011 Evaluation of Title 24 Acceptance Testing which found that acceptance testing by untrained, unqualified personnel was not effective.<sup>5</sup>

Fundamentally, the CEC should recognize that multifamily buildings four habitable stories or greater are more complex, use more energy and pose greater public health and safety concerns. For that reason, it would be a mistake to treat these size buildings the same as smaller residential buildings. Instead, their added complexity, energy usage, Indoor Air Quality (IAQ), and safety concerns warrant following requirements similar to those imposed on non-residential projects. Extending the requirements and procedures of small residential projects into multifamily buildings four habitable stories or greater is moving in the wrong direction.

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<sup>4</sup> 2019 *Building Energy Efficiency Standards for Residential and Nonresidential Buildings: For the 2019 Building Efficiency Standards, Title 24, Part 6, and associated administrative regulations in part 1.* (2018). Sacramento, CA: California Energy Commission.

<sup>5</sup> Tyler, M., Farley, J., & Crowe, E. (2011). *Evaluation of Title 24 Acceptance Testing Enforcement and Effectiveness.* California Commissioning Collaborative.



We would strongly encourage this proposal to instead consider:

**Procedure:**

- HVAC systems shall be leak-tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual<sup>6</sup>
  - Sets roles and responsibilities for system designer, installing contractor, testing contractor, manufacturer, code authority, and owner.
  - Method for pass-fail leakage criteria including test pressure, allowable leakage from duct, allowable leakage from accessories, and allowable leakage from equipment.
  - Allowable Leakage determined for individual components which promotes the specification and installation of equipment and accessories with low leakage that can physically achieve the desired results.

**Workforce Standards:**

- System air leakage testing should be limited to a Mechanical Acceptance Test Technician (MATT), who is also a technician certified as a Testing, Adjusting, and Balancing Technician (AABC, NEBB, or TABB) or as a Duct Air Leakage Technician by the International Certification Board (ICB).
  - Technicians complete extensive training in the proper use of these SMACNA test methods, mechanical system understanding and the knowledge of the principles of air flow and pressure measurements.
  - Certification organizations have proven methods for quality control.
  - [See Testing, Adjusting and Balancing HVAC Systems: An Overview of Certification Agencies – 2020 Technical Report](#)<sup>7</sup>

Thank you for your consideration.

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<sup>6</sup> *System Air Leakage Test Manual*. (2020). Chantilly, VA: SMACNA.

<sup>7</sup> Meyers, F., & Pistochini, T. (2020). *Testing, Adjusting and Balancing HVAC Systems: An Overview of Certification Agencies* (Tech.). Davis, CA: UC Davis - Western Cooling Efficiency Center. <https://wcec.ucdavis.edu/wp-content/uploads/TAB-Technical-Report-051220.pdf>



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