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September 4, 2014

VIA E-MAIL AND OVERNIGHT MAIL

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 14-BST-01
1516 Ninth Street
Sacramento, CA 95814
docket@energy.ca.gov

Re: 2016 Building Energy Efficiency Standards Pre-Rulemaking - HVAC

Dear Commission Staff:

The following comments are submitted on behalf of the Joint Committee on Energy and Environmental Policy ("JCEEP") in response to the 2016 Building Energy Efficiency Standards Pre-Rulemaking proposals for HVAC efficiency requirements. The JCEEP is made up of the California sheet metal workers' local unions and more than 25,000 technicians working for over 600 contractors throughout California.[1] JCEEP's mission is to promote responsible environmental, indoor air quality and energy policy in California as it pertains to and impacts the heating, ventilation and air conditioning ("HVAC") industry. JCEEP's members have over 15 training facilities throughout the state and thousands of workers being trained daily in HVAC specialties, such as testing, adjusting and balancing, commissioning, green building design, energy efficiency, sound and vibration control, and indoor air quality.

[1] The sheet metal workers unions are locals of the International Association of Sheet Metal, Air, Rail & Transportation Workers ("SMART").

The sheet metal workers' unions have long advocated for and participated in the development of building standards for mechanical systems in order to safeguard the public health, achieve energy efficiency and ensure performance and durability of systems. JCEEP was established to continue this tradition of advocacy in California. JCEEP was formed on the premise that HVAC systems need to be designed not just to manage comfort levels of indoor air, but also to protect against contaminants and health threats, to ensure reliability and quality, and to ensure energy efficiency.

The JCEEP supports the proposals made at the June 12, 2014 Staff Workshop to update the Title 24 HVAC equipment standards to those levels adopted in ASHRAE 90.1-2013. The JCEEP also supports increases in fan efficiency. However, these proposals are just band-aids and do not come close to moving California to the level of energy savings necessary to meet its Zero Net Energy building goals. The ASHRAE standards should be exceeded where feasible.

More importantly, the 2016 standards need to address other aspects of the HVAC system that may have a substantially greater effect on the energy draw of fans and other HVAC system components than just the energy efficiency rating of the individual equipment. Addressing system inefficiencies will save substantially more energy at a substantially greater rate of cost-effectiveness than continuing to make individual HVAC components incrementally more efficient. For example, the additional energy draw on a fan from leaks in an HVAC system and from the static pressure loss regularly found in long flex duct systems will greatly exceed the energy savings from an increase in the minimum Fan Efficiency Grade. These system energy losses should be addressed first.

In particular, JCEEP recommends that the Commission move toward testing of system leakage. Duct leakage tests alone only address one part of the system. U.C. Davis has developed a system leakage test that ASHRAE is in the process of adopting.[2] The ASHRAE standard adoption process, however, is slow and includes numerous stakeholders that may have an economic interest in watering down or delaying adoption of the test. The Commission need not, and should not, wait for

[2] Walker, et al, Lawrence Berkeley National Laboratory, Development of a New Duct Leakage Test: Delta Q (LBNL 47308) (2001), http://eetd.lbl.gov/sites/all/files/lbnl-47308.pdf. See also http://eetd.lbl.gov/node/50485.

ASHRAE to take the lead on this issue. The UC-Davis system leakage test is available now. The JCEEP urges the Commission to adopt it as part of the 2016 code.

In addition, JCEEP urges the Commission to move toward strict limits on the use of duct and duct designs that, in practice, are resulting in obstructions, friction, and static pressure loss that result in increased energy draws from fans, coils and other HVAC system components. For example, strict limits on the use of flex duct are likely necessary to reduce system inefficiencies to a level that would support zero net energy buildings. Numerous studies have confirmed that, in practice, longer lengths of flexible duct result in significant reductions in duct system performance, efficiency, reliability and operation. Flex duct has been demonstrated to result in more than a 60 percent higher pressure drop than galvanized metal duct of the same diameters.[3]

While some studies have shown flex duct to perform adequately when fully stretched without any significant bends or turns, surveys have demonstrated that it is entirely unrealistic to expect flexible ducts of any significant length to actually be installed in a fully stretched position with no significant bends or turns. When housing and industrial installations of flexible duct pipe were reviewed, *not a single installation was found to be in compliance* with installation requirements. Moreover, enforcement of installation requirements is almost impossible because improperly installed flexible duct is difficult to detect or verify after installation.[4] Even if reliable detection methods were available, inspectors do not have the resources or time to measure the compression of all flex duct runs after installation or to observe and measure the radius of all bends.

Due to these performance and verification limitations, the trend in the industry has been to recommend greatly limiting the allowable length of flex ducts. The 2009 ASHRAE Fundamentals Books states that for commercial systems, flexible ducts should be no more than 5 feet in length, full stretched.[5] The Department of Defense similarly recommends limiting flexible duct lengths to no more than 6 feet.[6] Energy Design Resources has also recommended that flex duct

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[3] HVAC Flexible Duct Pressure Loss Measurements, ASHRAE RP-1333 (March 2011) at p.44.
[4] HVAC Flexible Duct Pressure Loss Measurements, ASHRAE RP-1333 (March 2011) at p.44.
[5] 009 ASHRAE Fundamentals Handbook.
[6] See Dept. of Defense, UFC-3-400-10N (July 2006) at p. 11.

runs be limited to six feet or less, as well as supported at five foot intervals and with a bend radius of greater than one times the duct diameter.[7] The JCEEP urges the Commission to adopt similar restrictions as part of the 2016 code.

Increased energy efficiency requirements on system equipment will not be sufficient to meet the Commission's goal of zero-net energy buildings without also implementing system leakage tests and limitations on duct design and materials based on actual field performance issues. These issues should be addressed in the 2016 code.

Thank you for your consideration of these comments.

Sincerely,

Thomas A. Enslow

TAE:ljl

[7] Energy Design Resources, Design Brief, Integrated Design for Small Commercial HVAC at p. 11.