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Description:	Comments submitted by Energy Commission staff on behalf of Andy Llora and Dane Stevenson, QC Manufacturing, Inc.
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August 31, 2017

Mr. Todd Ferris
California Energy Commission
Docket Unit, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Docket: 17-BSTD-01 WHF HERS Verifications

Submitted by: Andy Llora / Dane Stevenson

QC Manufacturing, Inc.

The following comments are submitted in order to raise a set of issues that must be taken into heavy consideration when defining the protocol for HERS procedures with WHF systems. Further discussion will be recommended to resolve some of these matters.

Proposed changes to prescriptive Watt/CFM Ratio

We are recommending that the prescriptive watt/cfm ratio be modified to 0.15 watt/cfm to include more manufacturer's products, and for the prescriptive values to be more realistic as there are little to no products able to meet the prescriptive ratio.

HERS Verifications Implementation during 2017 Code cycle

Due to the current language in the code which pertains to NFVA and the existence of this value on the CF-2R Mech 02 form, implementing a HERS test during the current code cycle is unlikely to result in any homes actually passing due to the following:

- Hundreds of homes were modelled using HVI-916 approved airflow rates in a 0 static environment, no product will be able to maintain the identical or better airflow rates in a field environment where static pressure is present, when compared to a modelled value of lab condition figures.
- Also, static pressure in field is a required and functional component of whole house functionality and should not be considered a negative impact to efficacy of energy savings or fan efficacy. Whole house fans require the buildup of static pressure in the attic in order to flush out the hot attic air, in addition, they generate negative static in high amounts, in the home, in order to pull in outside cooler air.
- Making any assumptions or measurements of static pressure during whole house fan operation is counterintuitive to the functionality of whole house fans, and we feel that static pressure should not be factored into the HERS verification process.

Removal of NFVA from language for 2019 code HERS

If HERS testing is implemented in next 2019 code cycle, it is imperative that NFVA be removed from the CF-2R Mech-02

- The amount of NFVA is a figure that is not modelled on T24, so it should not be on the CF-2R form to be verified by the installer.
- There is no reason to verify this figure, if whole house fan meets CFM and wattage in the field verification test(s).
- The installing mechanical or electrical trade installing the WHF is not qualified to certify on the registry if adequate venting is installed, nor do they have the insurance required to walk on the roof and remedy the added venting, should a failure occur. Therefore they cannot be expected to certify this value on the current CF-2R Mech-02.
- We recommend that the CF-2R contain CFM airflow and wattage, so that installers that are responsible to ensure that the installed fan meets the modelled CFM and wattage.
- Builders are already required to install the minimum required venting amounts per the whole house fan manufacturer installation manuals, to alleviate any SB800 warranty issues.

We have concerns regarding the testing methods and measurement equipment

How many field verifications using blower door have taken place, and what are the deltas compared to HVI certification?

How accurate is the proposed HERS method compared to the currently accepted HVI rating system?

What powered flow hood can measure 6500-15,000 CFM accurately? It is highly unlikely that any equipment available for purchase by a HERS rater is capable of measuring results as accurately as a calibrated HVI booth.

The margin of error must be accounted for, to allow WHF to be modelled with CFM padded values (lower than HVI) which can be attained in the field while the system is under real-world static pressure, and have no loss in compliance for this padded amount, since this exists in the reference study homes for which Night Cooling Ventilation studies were performed.

Current T24 software gives huge penalties for 50-100 cfm below the prescriptive amounts. If we have to pad our CFM values by 200 cfm to pass in the field, they will get 0 compliance credit.

Modelling assumption penalties are overwhelmingly ignored

As we tighten up the measurements and modelling figures with CFM padding to pass HERS verification, the compliance hit is significant, even for a small amount such as 50 or 100 CFM, resulting in lost compliance on T24 cooling improvement from 3-10%.

The recommended offset we are requesting is insignificant compared to the current penalty of having the modelling software assumption that whole house fans are run from 7pm to 11pm only. We all know in a real world application, homeowners run their whole house fans on low speed all night long.

The homeowner savings from 11pm to 7am is massive since the fans operate on 50-80 watts on low speeds with PSC/ECM motors.

The existing penalties described above should be taken into account as we request and recommend that WHF HERS verifications be given a padding of a few 100 CFM during modelling that does NOT result in a drop in compliance of 5-10%.

Elimination of HVI Pre Certification

Using a HERS test to verify an HVI value is the equivalent of having a HERS rater verify the actual SEER and EER in the field and try to match AHRI lab tested figures for HVAC equipment, and making up a field SEER EER test. That is simply unnecessary for whole house fans, which have been 3rd party pre certified in HVI lab conditions. This is no simple endeavor.

We are assuming that HVI precertification will no longer be required if field verification is implemented. It is nearly impossible for a mfg. to determine how many CFM our products will deliver in the near infinite number of attic volumes in which they can be installed.

If HVI certification is eliminated, and mfg. must determine how much CFM we can safely be modelled on t24, and be able to hit that figure in the field, the amount of padding we would need to use on our CFM would most certainly eliminate the compliance % boosts of installing a whole house fan to begin with. This could result in negating the already small compliance given, for one of the most energy saving appliances known by the CEC which can deliver 50-90% reduction in a/c usage.

HVAC vs. Whole House Fan verification considerations

It is my understanding that engineers at the CEC consider the HERS test of whole house fan to be very similar to Airflow / watt draw tests for HVAC systems, and that is systemically erroneous.

An HVAC system is sensitive to static pressure, so testing cfm and wattage makes sure that adequate static is met in the closed loop duct system. The presence of static pressure in a closed HVAC loop is a negative reflection that ducts have been improperly sized, pinched or bent excessively. Without directly measuring static, HERS measuring of CFM and wattage allows us to detect the presence of improper amounts of static pressure, which would impede system functionality significantly.

However, whole house fans are open loop systems, open on both ends to the outside. During operation, the whole house fan system USES the generation of positive and negative static pressure to create airflow out from the attic, and for outside air to be pulled into the home. The presence of static pressure is a given and required functional component, not a negative factor in whole house fan operation.

Therefore the higher static pressure in the attic, the faster the velocity at which the hot air will evacuate from the attic, and higher attic and in-home turbulence exists during that mass cooling process.

For this reason, we recommend that the CEC pay close attention to how much “padding” mfg. will have to do in order to pass, and in realistic field applications, it will not negate any savings to the homeowner, so compliance should not be negatively impacted for 100 CFM drop on t24 model, as the current software calculations show.

Proposed HERS verification procedure, WHF are not HVAC systems:

We request that the CEC considers one additional HERS test, where the HERS rater verifying the model number of installed WHF system, and verifying the CFM/watt values on the CEC certified products database.

WHF are simply large exhaust fans, and should be tested like kitchen range hoods

HVI certification is already an accepted protocol for kitchen range hoods. Those are not tested in field for CFM or wattage. They are essentially exhaust fans, and operate closer in functionality to a whole house fan than an HVAC system does.

Testing a whole house fan system as if it is an HVAC system is an engineering mistaken assumption that whole house fans are similar to closed loop HVAC systems, and they are not similar **at all**.

A simple indicator of this is our 6 ft duct is capable of delivering well over 4000 cfm. Proven to do so using HVI certification at 0 static.

No HVAC system engineer using Manual D will attempt to force 4000 cfm through a 20" duct, because in closed loop HVAC systems, that is not possible.

We urge the CEC to consider that whole house fans are not similar to HVAC systems, they are in fact the polar opposite.

Since the HVI certification process is already in place, and is already an accepted set of CFM/watt data, it can be used for simple verification for 2016 code projects with very little transitional efforts or complications, and would be similar to SEER/EER verification using the AHRI database, which is an acceptable protocol for Furnace/condenser/coil combinations.

This HERS verification would be by far the easiest to adopt across all interested parties.

Proposed Additions to Compliance Options

ECM motors and multi speed fans offer homeowners massive savings compared to the non-ECM whole house fans, at a considerable cost impact to builders as well. Builders should be given due credit for investing in whole house fans with ECM motors especially when 2-3 speeds are available.

Current software for T24 models the highest speed settings for CFM and watt consumption. We know, and educate all homeowners that the fans should be run on high for only 1 hour, and the duration of the evening should be on low speeds.

A whole house fan with ECM motors running on low speed consumes 50-75 watts, yet has the ability to mass cool the structure by running all night long, attaining temperatures as low as 65 degrees in the entire home and attic simultaneously.

We are recommending that the CEC considers adding a checkbox in CBECCRes & Energy Pro for ECM motors on the whole house fan measure parameters, which should result in a boost to compliance for these builders who have invested in ECM motors.

We are also recommending that the CEC considers adding a checkbox in CBECCRes & Energy Pro for Multispeed on the whole house fan measure parameters, which should result in a boost to compliance for these builders who have invested in multispeed whole house fan systems.

QC Manufacturing, Inc. appreciates the Energy Commission's consideration of these comments and looks forward to collaborating with the Energy Commission and stakeholders as these standards are further developed. Please do not hesitate to contact me at (209) 342-9482 with any questions or concerns you may have. I am available to discuss these matters further at your convenience.

Sincerely,

Andy Llora

QC Manufacturing, Inc.