



## Cold Climate Air Source Heat Pump Specification- Version 2.0 Proposal

NEEP began discussing potential revisions to the [Cold Climate Air Source Heat Pump Specification](#) (ccASHP Specification) with the cold climate metrics sub-committee in the fall of 2015. Based on sub-committee meeting teleconferences, survey results and additional input received over the past six months, NEEP proposes the following revisions as a Draft Version 2.0 ccASHP Specification. The rationale for the proposed changes is included below. We have also described a high-level long-term vision for Version 3.0.

**Comments:** NEEP strongly encourages the members of the Air Source Heat Pump working group and other interested stakeholders to submit written comments to NEEP via email (Samantha Bresler: [sbresler@neep.org](mailto:sbresler@neep.org)) by Friday, April 8<sup>th</sup>. Please note that only written comments will be accepted.

Existing Specification Performance Requirements	Proposed Specification Version 2.0 Performance Requirements (Effective date- January 1, 2017) Changes highlighted in RED
<ul style="list-style-type: none"> <li>Compressor must be variable capacity</li> </ul>	<ul style="list-style-type: none"> <li>Compressor must be variable capacity</li> </ul>
<ul style="list-style-type: none"> <li>Indoor and outdoor units must be part of an AHRI matched system</li> </ul>	<ul style="list-style-type: none"> <li>Indoor and outdoor units must be part of an AHRI matched system</li> </ul>
<ul style="list-style-type: none"> <li>ENERGY STAR Certified</li> </ul>	<ul style="list-style-type: none"> <li>ENERGY STAR Certified</li> </ul>
<ul style="list-style-type: none"> <li>COP 5° F <math>\geq 1.75</math> (at maximum capacity operation) for all ductless systems (single-zone and multi-zone)</li> </ul>	<ul style="list-style-type: none"> <li><b>COP 5° F <math>\geq 2.0</math> (at maximum capacity operation) for all ductless systems (single-zone and multi-zone)</b></li> </ul>
<ul style="list-style-type: none"> <li>COP 5° F <math>\geq 1.75</math> (at maximum capacity operation) for all ducted systems</li> </ul>	<ul style="list-style-type: none"> <li>COP 5° F <math>\geq 1.75</math> (at maximum capacity operation) for all ducted systems</li> </ul>
<ul style="list-style-type: none"> <li>HSPF <math>\geq 10</math> for Single-zone Ductless systems and all Ducted Systems</li> </ul>	<ul style="list-style-type: none"> <li>HSPF <math>\geq 10</math> for Single-zone Ductless systems and all Ducted Systems</li> </ul>
<ul style="list-style-type: none"> <li>HSPF <math>\geq 9</math> for Multi-zone Ductless systems</li> </ul>	<ul style="list-style-type: none"> <li><b>HSPF <math>\geq 10</math> for Multi-zone Ductless systems</b></li> </ul>
<ul style="list-style-type: none"> <li>Engineering data for each system must be reported through the attached “<i>Cold Climate Air-Source Heat Pump Performance Information Tables</i>”. Incomplete tables will not be considered.</li> </ul>	<ul style="list-style-type: none"> <li><b>Lab testing results or</b> Engineering data for each system must be reported through the attached “<a href="#">Cold Climate Air-Source Heat Pump Performance Information Tables</a>”. Incomplete tables will not be considered.</li> </ul>

### Logic

**Increase in COP 5°F to 2.0 for Ductless Systems:** NEEP proposes an increase to the COP 5°F for ductless systems (both single-zone and multi-zone) for both qualitative and quantitative reasons.

Qualitatively, NEEP is interested in supporting improvements in cold temperature ASHP performance. By raising the bar on COP 5°F, we believe we are helping to send signals to the marketplace that ASHP stakeholders in the Northeast are interested in seeing progression in cold-climate heat pump technology.



The original purpose of the ccASHP specification is described in the current specification:

*“The specification was designed to identify air-source heat pumps that are best suited to heat efficiently in cold climates (IECC climate zone 4 and higher). The specification is intended as a model equipment specification to be used broadly by energy efficiency program administrators in cold climates as a minimum requirement for program qualification. It also is intended for engineers, contractors, and other practitioners who need assurance that the equipment they select will have the required heating capacity at design temperature without unnecessary oversizing, and will serve the load efficiently throughout the ambient temperature range.”*

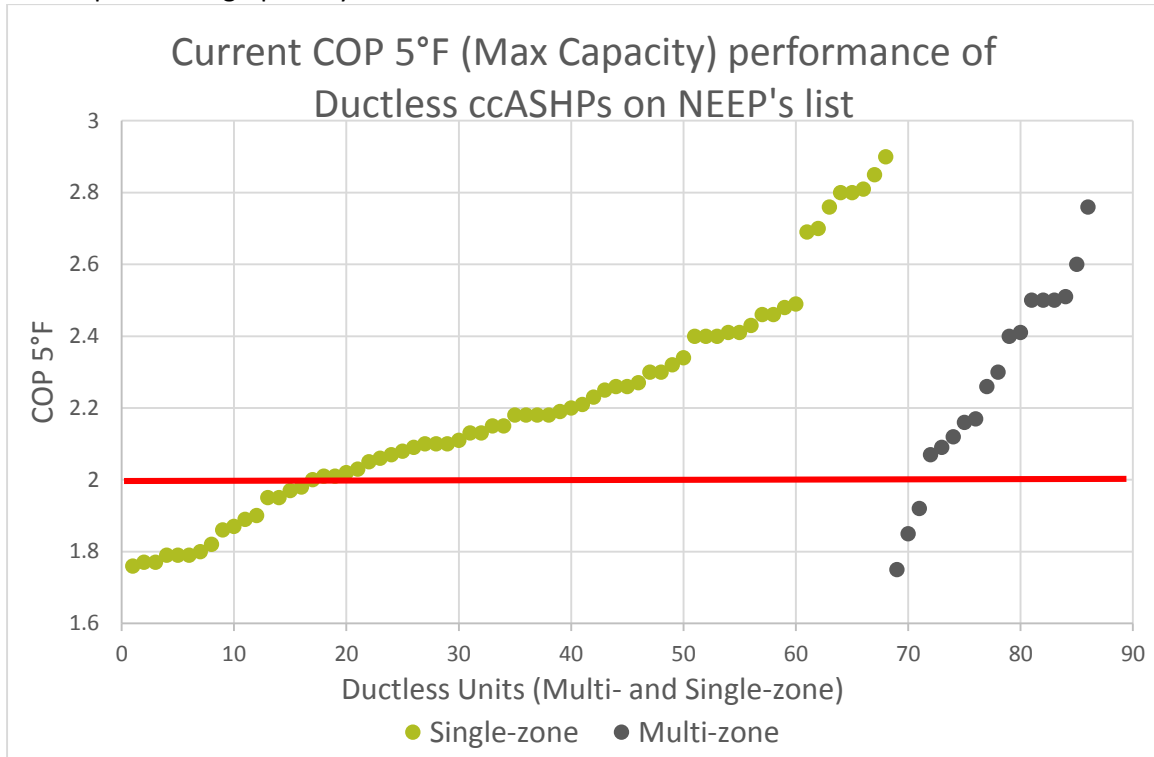
We believe raising the requirement for COP 5°F will help to further identify those heat pump systems that are, “best suited to heat efficiently in cold climates”.

Quantitatively, the market appears to be well positioned to make this improvement. In an analysis demonstrating how various increases in COP 5°F would impact the ductless products on the current list, the following was established:

- The numbers below reflect the percentages of current qualifying ductless products that would meet a COP 5°F  $\geq 2.0$  (at maximum capacity) and an HSPF  $\geq 10$ .
  - 76% of the single-zone ductless products on the current list
  - 72% of the multi-zone ductless products on the current list
- Of the roughly 30 units submitted in 2016, the numbers below reflect the percentages of qualifying products that meet a COP 5°F  $\geq 2.0$  (at maximum capacity) and an HSPF  $\geq 10$ .
  - 90% of the single-zone ductless products submitted since Jan 1, 2016
  - 88% of the multi-zone ductless products submitted since Jan 1, 2016
- All manufacturers currently represented on the NEEP listing will continue to maintain product that meet a COP 5°F  $\geq 2.0$  (at maximum capacity) and an HSPF  $\geq 10$ .



The same data presented graphically:



**Increase in Multi-zone HSPF to 10:** NEEP is proposing to align the HSPF requirement for *multi-zone ductless* products with that of single zone ductless and ducted systems. The existing exception for multi-zone systems was originally included to accommodate the first generation of multi-zone systems on the market. That exception does not appear to be necessary, given that 16 of the 18 currently qualifying systems would meet the increased threshold.

**Source of Performance Data**

NEEP is aware that low temperature lab testing is becoming more readily available to manufacturers. We do not want to discourage manufacturers from providing lab results at 5°F, so we've added language suggesting that performance data can come from either lab results OR engineering calculations.

**Voluntary Testing/Engineering Reporting:** In an effort to make more information available to the public, NEEP is proposing to offer manufacturers the opportunity to indicate as to whether their 5°F data is derived from lab test results or engineering data. Many individuals have expressed interest in knowing whether the data at 5°F is derived from lab test results or engineering data.

**Version 2.0 Effective Date**

NEEP proposes to make version 2.0 effective on January 1, 2017, in line with the calendar year. Many energy efficiency programs make changes based on this calendar. If there are more appropriate times to make Version 2.0 effective, please provide more information.



Lastly, in the event that a revised specification would remove some products from the current list, NEEP would maintain some form of archive to maintain the valuable information captured by the reporting tables.

### **Vision for Future Specification Revision (Version 3.0)**

From the launch of the ccASHP specification over a year ago, there has been an acknowledgement that while the reported performance data is of great value, the lack of a standardized test procedures (particularly at 5°F) has been a key deficiency that all of the stakeholders are interested in overcoming. Two organizations, US DOE and the CSA Group, are in the process of developing and implementing new test procedures for heat pumps. They present potential pathways to achieve improved test procedure accuracy, and more specifically, industry-wide consistency for the 5°F rating point.

- DOE recently published a proposed revision in November, and expect to finalize the test procedure within the next six months (Available mid-2016). Appendix M1 includes a few important improvements, including a voluntary low temperature test (proposal was for 2°F, but input was to adjust to 5°F), but maintains its fundamental flaws associated with variable capacity system modulation. M1 will not be required until 2023, but can be used as soon as the test procedure is published. Questions remain about when the test procedure will be finalized and whether it would provide a pathway to the measurements the specification is trying to capture (i.e. performance at true maximum capacity at 5°F).
- CSA Group in Canada convened a Development Committee in July of last year to develop a “non-accredited” testing standard. Committee members have reported that the CSA standard will not only include additional low temperature test points to the test but will allow variable capacity systems to in fact modulate during testing, capturing a more accurate representation of field performance. While CSA process has an expected finalization of Q4 in 2016, the test procedure will not be ready for immediate ccASHP application. In order to leverage the new CSA test procedure, product test results will need to be accumulated before they can inform any kind of performance threshold. NEEP expects this to take at least 6 months. (usable results expected Mid-2017)

NEEP intends to track and assess the developments related to these two processes. We are hopeful that at least one of these processes will result in an industry recognized procedure to measure performance at lower temperatures. The sub-committee will evaluate the final test procedures and make a recommendation as to whether a future cold-climate ASHP Specification revision should incorporate a new test procedure. We do not expect this process of finalization and evaluation to be completed before the middle of 2017. Based on projected time necessary to develop a revised specification and provide lead time to industry to prepare, we do not expect Version 3.0 would be effective until mid-2018 at the earliest. Please note that these projected dates may change based on evolving circumstances.

The projected effective date for a Version 3.0 further supports making near term changes included in this Version 2.0 proposal. NEEP is concerned that leaving the current specification unchanged until mid-2018, a total of over 3 years from its introduction, in rapidly evolving market, would not support the differentiation or advancement we are interested in driving.