What is SCOP?

SCOP = Seasonal Coefficient of Performance (Seasonal COP)

SCOP is the seasonal average COP, similar to HSPF. The seasonal average efficiency of heating (or cooling) is the most important metric when judging the efficiency of a heat pump. Because a properly sized heat pump runs at full speed only a small percentage of the season, full-speed efficiency is far less important than the overall seasonal average efficiency. That's why seasonal average efficiency metrics like SEER, IPLV, SCOP, and HSPF have been established—and they matter much more than simple COP or EER.

In the USA, air-to-water heat pumps (AWHPs) are rated and certified under AHRI 550/590. This testing and certification standard does not provide for an HSPF (Heating Seasonal Performance Factor) rating, so technically HSPF does not exist for air-to-water heat pumps. Fortunately, the European testing and certification standard EN 14825 measures Seasonal Average COP (called SCOP), which is essentially the same metric as HSPF.

Definition of SCOP:

The total heating output of a heat pump during its normal annual usage period divided by the total electric energy input during the same period, in consistent units (e.g., Wh/Wh).

Definition of HSPF:

The total heating output of a heat pump during its normal annual usage period divided by the total electric energy input during the same period, in non-consistent units (e.g., Btu/Wh).

How, When, and Where SCOP and HSPF Are Used:

HSPF is currently available only for air-to-air heat pumps. Because no official HSPF rating exists for AWHPs, most air-to-water heat pump manufacturers simply publish their own self-determined COP values. COP is a full-speed metric measured at a specific test condition and does not represent seasonal average performance. Many AWHP manufacturers also publish "performance maps" showing full-speed COPs at various outdoor temperatures and supply water temperatures. Most of this COP data is uncertified and internally generated for marketing purposes.

In Europe, however, heat pump manufacturers are required to have official third-party testing and certification of heating performance—including seasonal average performance—under EN 14825. This provides officially certified data showing the Seasonal Average COP, called SCOP. SCOP is essentially the same as HSPF but expressed in consistent W/W units.

What is SCOP?

While waiting for U.S. certification standards to catch up, Chiltrix submitted its heat pumps for European laboratory testing (TÜV, SGS) to obtain official EN 14825 certification for heating performance. All Chiltrix heat pumps have been tested to EN 14825 and have received official European SCOP certification. Chiltrix customers can therefore know the real heating performance and seasonal average efficiency with confidence, because the data comes from independent, third-party testing and certification. Chiltrix took this step to provide reliable, verifiable data that engineers and users can fully trust—and to differentiate itself from manufacturers that publish only self-reported data.

As you might expect, Chiltrix performed exceptionally well, earning the highest rating possible—A+++—on all models, along with a global-record-setting SCOP of 5.36 on the CX65 model. (*Excluding R290 units, which are not legal in the U.S. market.)

About EN 14825:

All Chiltrix published EN 14825 SCOP values represent heating Seasonal Average Coefficient of Performance in the average European heating climate. EN 14825 uses a standardized temperature bin table. Its climate profile is significantly colder than U.S. DOE Region IV (the basis for HSPF ratings), so comparisons are conservative.

U.S. DOE Climate Zone 5A is highly similar to the EN 14825 climate and is often used as a reference. Climate Zone 5A is a cold climate that includes cities such as Hartford, CT; Chicago, IL; Manchester, NH; Rochester, NY; and Pittsburgh, PA. EN 14825 and Zone 5A share the same design temperature and have a very comparable distribution of hours across temperature bins. This close match makes the EN 14825 SCOP rating especially relevant and representative for expected seasonal heating performance in many colder U.S. locations.

About HSPF:

As of January 2023, more stringent efficiency metrics (HSPF2 and SEER2) were introduced to better account for airflow resistance and duct system losses. For example, a unit previously rated at 8.8 HSPF would equate to roughly 7.5 HSPF2. These changes are not highly relevant to most Chiltrix systems—particularly those using radiant heating or ductless fan coils—because they have no ducts and therefore incur no duct losses. HSPF (and HSPF2) ratings are based on climate conditions in U.S. DOE Region IV.

What is SCOP?

HSPF and SCOP Calculations:

HSPF is calculated in Btu/Wh and SCOP in Wh/Wh. Therefore, dividing HSPF by 3.412 gives the equivalent SCOP, and multiplying SCOP by 3.412 gives the equivalent HSPF. This conversion is analogous to the relationship between EER and COP described in ANSI/ASHRAE/IES Standard 90.1-2019.

For example:

- The Chiltrix CX35 (SCOP 4.67) ≈ HSPF 15.93
- The Chiltrix CX50 (SCOP 4.55) ≈ HSPF 15.52
- The Chiltrix CX65 (SCOP 5.36) ≈ HSPF 18.29

These values are approximately double the seasonal average efficiency of most air-source heat pumps, which only require a minimum HSPF2 of 7.8 for ENERGY STAR certification.

A Very Conservative Comparison:

Converting SCOP to HSPF using the industry-standard 3.412 factor is mathematically correct. However, because HSPF is rated in a much warmer climate than EN 14825 SCOP, applying an additional 20–30% derate would be appropriate (though it is not typically included). In a true apples-to-apples comparison under identical test conditions, the equivalent HSPF would be lower, or the SCOP higher, by as much as 30%.

Summary:

Official third-party certified COP and SCOP ratings provide the most trustworthy measure of a heat pump's real-world seasonal heating efficiency. With officially certified EN 14825 data, engineers and users can confidently compare performance across climates, knowing they are evaluating proven numbers rather than optimistic marketing claims. Chiltrix's A+++ ratings and world-record SCOP values—equivalent to HSPF levels as high as 18.29—deliver a clear advantage, especially in colder U.S. zones, resulting in superior energy savings and better-informed decision-making.