

AHRI Standards 550/590 and 551/591

2018 Standard for Performance Rating of Water-chilling and Heat Pump Water-heating Packages Using the Vapor Compression Cycle

Changes
from 2015,
Addendum 1

Major Additions

1. **Table 3:** ACCL NPLV requirements
2. **Sections C3.2, C6.2.1, C7.1 and new Appendix I:** Clarified requirements for testing units using averaged test data
3. **Table 12 and Section 5.7:** Testing requirements for units with cycling fans
4. **Table 14:** Requirements for publishing IPLV full-load capacity and atmospheric pressure
5. **Section C3.6:** Rounding requirements for energy and voltage balance
6. **Section C4.5.2.1.5:** Voltage difference tolerance for redundant instrumentation

1. ACCL NPLV requirements

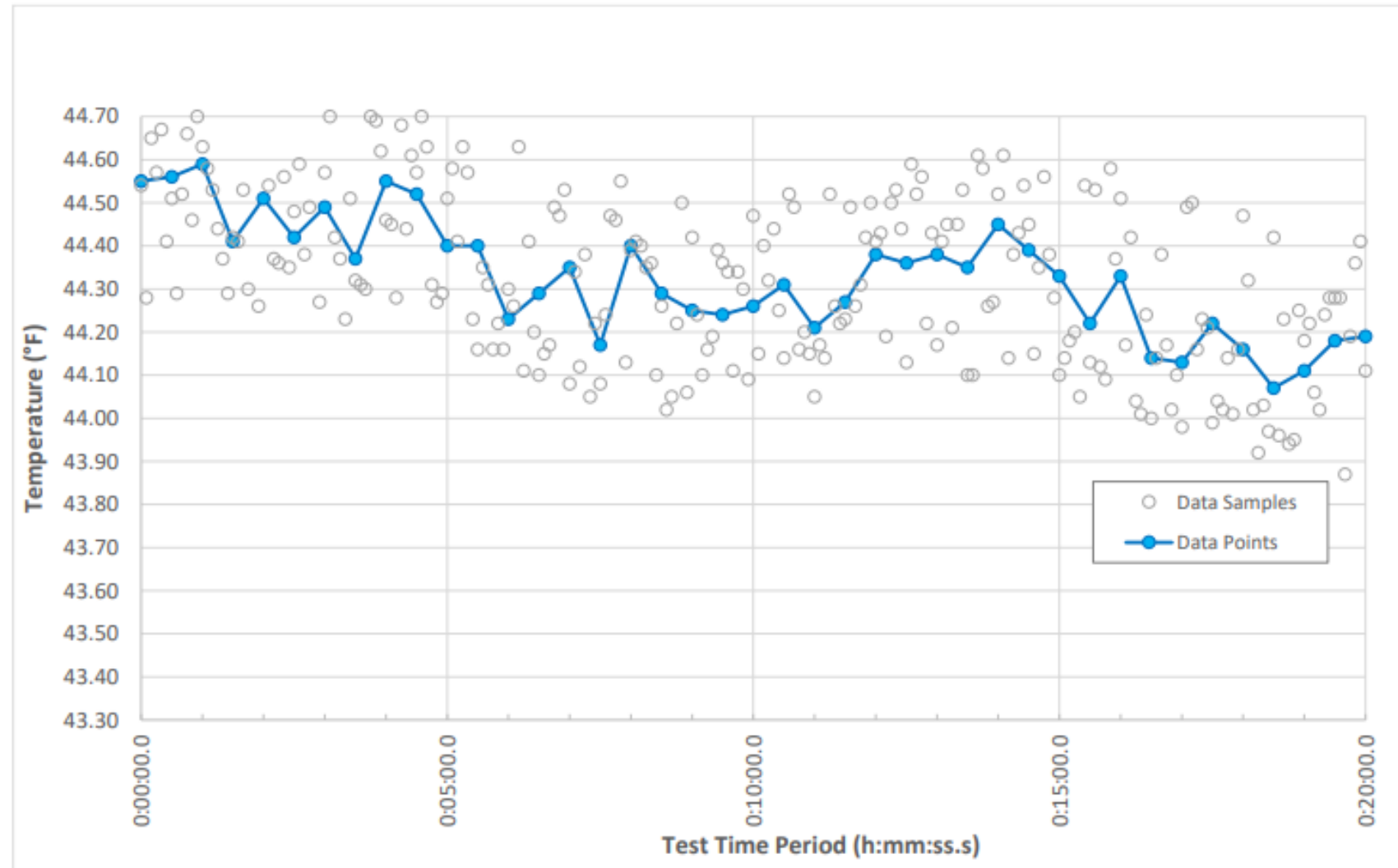
NPLV defined for the following condenser types:

- Air-cooled
- Evaporatively-cooled
- Air-cooled Without Condenser
- Water-cooled or Evaporatively-cooled Without Condenser

Table 3. Part-load Conditions for Rating		
	IPLV.IP ⁷	NPLV.IP
<i>Evaporator (All Types)</i> All loads LWT ² , °F Flow Rate ³ , gpm/ton _R R_{cond} , h·ft ² ·°F/Btu	44.00 Per Table 1 0.000100	Selected LWT Per Table 1, Note 10 ³ As Specified
<i>Water-cooled Condenser^{1,2}</i> 100% load EWT, °F 75% load EWT, °F 50% load EWT, °F 25% load EWT, °F Flow rate ³ , gpm/ton _R R_{cond} , h·ft ² ·°F/Btu	85.00 75.00 65.00 65.00 Note ³ 0.000250	Selected EWT Note ⁴ Note ⁴ Note ⁴ Selected flow rate As Specified
<i>Air-cooled Condenser^{1,8}</i> 100% load EDB, °F 75% load EDB, °F 50% load EDB, °F 25% load EDB, °F R_{cond} , h·ft ² ·°F/Btu	95.0 80.0 65.0 55.0 0.000	Selected EDB Note ⁵ Note ⁵ Note ⁵ As Specified
<i>Evaporatively-cooled Condenser^{1,8}</i> 100% load EWB, °F 75% load EWB, °F 50% load EWB, °F 25% load EWB, °F R_{cond} , h·ft ² ·°F/Btu	75.00 68.75 62.50 56.25 0.000	Selected EWB Note ⁶ Note ⁶ Note ⁶ As Specified
<i>Air-cooled Without Condenser</i> 100% load SDT, °F 75% load SDT, °F 50% load SDT, °F 25% load SDT, °F R_{cond} , h·ft ² ·°F/Btu	125.00 107.50 90.00 72.50 0.000	Selected SDT Note ⁶ Note ⁶ Note ⁶ As Specified
<i>Water-cooled or Evaporatively-cooled Without Condenser</i> 100% load SDT, °F 75% load SDT, °F 50% load SDT, °F 25% load SDT, °F R_{cond} , h·ft ² ·°F/Btu	105.00 95.00 85.00 75.00 0.000	Selected SDT Note ⁶ Note ⁶ Note ⁶ As Specified

2. Clarified requirements for testing units using averaged test data

Clarification of requirements for time averaging of test data with an example shown in Appendix I.



3. Testing requirements for units with cycling fans

Table 12. Definition of Operating Condition Tolerances and Stability Criteria

Measurement or Calculation Result		Applicable Operating Mode(s)	Operating Condition Tolerance Limits	Stability Criteria
Condenser	Entering Air Mean Dry Bulb Temperature ³	Cooling with fan cycling	$ \bar{T} - T_{\text{target}} \leq 1.00 \text{ }^\circ\text{F}, 0.56 \text{ }^\circ\text{C}$	$s_T \leq 0.75 \text{ }^\circ\text{F}, 0.42 \text{ }^\circ\text{C}$
	Entering Air Mean Wet Bulb Temperature ³			

Additional Testing

- 1st test: start from 10°F above rated condition
- 2nd test: start 5°F below rated condition
- Average results to determine rating

4. Requirements for publishing IPLV full-load capacity and atmospheric pressure

Table 14. Published Values

Published Values	Units	Significant Figures ³	Water-Cooled Chiller (Cooling)	Water-Cooled Heat Recovery Chiller	Evaporatively Cooled Chiller	Air-Cooled Chiller	Condenserless Chiller	Air-Cooled HP (Cooling)	Air-Cooled HP (Heating)	Air Cooled Heat Recovery Chiller	Water to Water HP (Cooling)	Water to Water HP (Heating)	Simultaneous Heating and Cooling
General													
Voltage	V, kV	3	■	■	■	■	■	■	■	■	■	■	■
Frequency	Hz	2	■	■	■	■	■	■	■	■	■	■	■
Refrigerant Designation		-	■	■	■	■	■	■	■	■	■	■	■
Model Number		-	■	■	■	■	■	■	■	■	■	■	■
Net Capacity													
Full Load Refrigerating Capacity ⁷	ton _R , Btu/h	4	■	■	■	■	■	■		■	■	■	■
Heat Rejection Capacity	MBtu/h	4	■	■			■		■	■	■	■	
Heat Recovery Capacity	MBtu/h	4		■						■			

7. Full Load Refrigerating Capacity is the Full Load Net Refrigerating Capacity at the Rating Conditions and shall equal the 'A' point IPLV/NPLV capacity.

5. Rounding requirements for energy and voltage balance

C3.6 *Rounding.* Reported measurement data and calculated test results shall follow the rounding requirements in Section 4.3, making use of the significant figure requirements of Table 14. Energy balance and voltage balance shall be rounded to four (4) significant figures.

6. Voltage difference tolerance for redundant instrumentation

C4.5.2.1 *Measurement Verification:* Redundant instrument measurements shall be within the limitations below:

C4.5.2.1.1 Entering water temperature measurements shall not differ by more than 0.20°F

C4.5.2.1.2 Leaving water temperature measurements shall not differ by more than 0.20°F

C4.5.2.1.3 Flow measurements shall not differ by more than 2%

C4.5.2.1.4 Power input measurements shall not differ by more than 2%

C4.5.2.1.5 Average voltage shall not differ by more than 2%