



FORM WCCL-PC2
WCCL IN-HOUSE TEST PROCEDURE AND CHECKLIST

AHRI CERTIFICATION PROGRAM FOR WATER-COOLED WATER
CHILLING AND HEAT PUMP WATER-HEATING (WCCL) PACKAGES

WCCL Participant: _____
Date of Test: _____
Test Number: _____
Test Results: _____

Instructions to Laboratory: The following Test Procedure and Checklist is to be used by the Laboratory Contracted by AHRI to document all steps required to conduct tests for the Water-Cooled Water Chilling and Heat Pump Water-Heating Packages (WCCL) Certification Program. This Test Procedure and Checklist is to be used in conjunction with the AHRI General Operations Manual (OM) for AHRI Certification Programs, the WCCL OM and the latest edition of AHRI Standard 550/590 (I-P) or AHRI Standard 551/591 (SI) (Standard). Where the AHRI General OM, the WCCL OM and this Witness Test Procedure and Checklist differ, the other documents shall prevail. The completed checklist shall be submitted to AHRI upon the completion of the witness test.

Select the Standard to be used to perform this test (select only one):

- _____ AHRI Standard 550/590 (I-P)
- _____ AHRI Standard 551/591 (SI)

REPRESENTATIVE INITIALS DATA POINT (IF APPLICABLE)

Pre-Test

_____ _____ When setting up to Test a Water-Cooled chiller for AHRI Certification Programs, several information items are required. Verify the following information as received from AHRI:

1. Chiller Model Number
2. Model Performance Ratings
3. Unit rated voltage, amperage and frequency
4. Data Sheet, including Fouling Factor Calculations and Water Side Surface Area for all heat exchangers
5. Random Operating Point (5th Point)

_____ _____ Verify all Laboratory instrumentation used have current calibration stickers.

REPRESENTATIVE DATA POINT (IF
INITIALS APPLICABLE)

Day of Test

_____	_____	Laboratory shall visually inspect and confirm the test sample chiller nameplate against the AHRI Selection Letter to confirm identity of the chiller under test.
_____	_____	For water pressure drop across the condenser, the "Zero" measurements shall be recorded and shall be zero, within a tolerance of $\pm 1.0\%$ of the full scale value of the calibration range of the measurement system. This verification can be completed before or after the test has been conducted.
_____	_____	For water pressure drop across the evaporator, the "Zero" measurements shall be recorded and shall be zero, within a tolerance of $\pm 1.0\%$ of the full scale value of the calibration range of the measurement system. This verification can be completed before or after the test has been conducted.
_____	_____	For water flow through the condenser, the "Zero" measurements shall be recorded and shall be zero, within a tolerance of $\pm 1.0\%$ of the full scale value of the calibration range of the measurement system. This verification can be completed before or after the test has been conducted.
_____	_____	For water flow through the evaporator, the "Zero" measurements shall be recorded and shall be zero, within a tolerance of $\pm 1.0\%$ of the full scale value of the calibration range of the measurement system. This verification can be completed before or after the test has been conducted.

REPRESENTATIVE INITIALS	DATA POINT (IF APPLICABLE)
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100% Full Load Test

_____	_____	After the proper refrigerant charge has been established, the refrigerant charging line shall be disconnected and remain off from the test sample during the testing
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_____	_____	The Laboratory shall verify that the Test Stand test conditions remain within the allowable tolerances for the duration of the test period.
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The Laboratory shall confirm all of the following data collected at each test point are in accordance with the Standard:

- | | | |
|-------|-------|---|
| _____ | _____ | 1.1 Data collected in accordance with Section C6.2.1 of the Standard. |
| _____ | _____ | 1.2 Heat balance is within tolerance per Table 13 of the Standard |
| _____ | _____ | 1.3 Evaporator water flow |
| _____ | _____ | 1.4 Leaving Evaporator water temperature |
| _____ | _____ | 1.5 Condenser water flow |
| _____ | _____ | 1.6 Entering Condenser water temperature |
| _____ | _____ | 1.7 Voltage (average of all phases) |
| _____ | _____ | 1.8 Frequency |

The Laboratory shall confirm all of the following at the conclusion of the test are in accordance with the Standard:

- | | | |
|-------|-------|---|
| _____ | _____ | 2.1 Calculated Capacity |
| _____ | _____ | 2.2 Calculated Efficiency |
| _____ | _____ | 2.3 Calculated Evaporator water pressure drop |
| _____ | _____ | 2.4 Calculated Condenser water pressure drop |
| _____ | _____ | For continuous unloading units, verify that the actual capacity at 100% Full Load is not greater than 105% of the rated performance |

75% Part-Load Test

_____	_____	The Laboratory shall verify that the Test Stand test conditions remain within the allowable tolerances for the duration of the test period.
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The Laboratory shall confirm all following data collected during the test are in accordance with the Standard

- | | | |
|-------|-------|--|
| _____ | _____ | 1.1 Data collected in accordance with Section C6.2.1 of the Standard |
| _____ | _____ | 1.2 Heat balance is within tolerance per Table 13 of the Standard |
| _____ | _____ | 1.3 Evaporator water flow |
| _____ | _____ | 1.4 Leaving Evaporator water temperature |
| _____ | _____ | 1.5 Condenser water flow |
| _____ | _____ | 1.6 Entering Condenser water temperature |
| _____ | _____ | 1.7 Voltage (average of all phases) |
| _____ | _____ | 1.8 Frequency |

The Laboratory shall confirm the calculated IPLV/NPLV is within tolerance at the conclusion of the test in accordance with the Standard

_____	_____	For continuous unloading units during part-load tests, verify the measured capacities are within tolerance ($\pm 2\%$ of the full load rated capacity). For discrete capacity step units, part-load test points shall be taken as close as practical to the specified part-load rating points as per Table 3 of the Standard.
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_____	_____	For discrete unloading units, verify that the condenser inlet water temperature is based on the measured capacity for the test as per Table 3 of the Standard.
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50% Part-Load Test

_____ _____ The Laboratory shall verify that the Test Stand test conditions remain within the allowable tolerances for the duration of the test period.

The Laboratory shall confirm all following data collected during the test are in accordance with the Standard

- _____ 1.1 Data collected in accordance with Section C6.2.1 of the Standard
- _____ 1.2 Heat balance is within tolerance per Table 13 of the Standard
- _____ 1.3 Evaporator water flow
- _____ 1.4 Leaving Evaporator water temperature
- _____ 1.5 Condenser water flow
- _____ 1.6 Entering Condenser water temperature
- _____ 1.7 Voltage (average of all phases)
- _____ 1.8 Frequency

The Laboratory shall confirm the calculated IPLV/NPLV is within tolerance at the conclusion of the test in accordance with the Standard

_____ _____ For continuous unloading units during part-load tests, verify the measured capacities are within tolerance ($\pm 2\%$ of the full load rated capacity). For discrete capacity step units, part load test points shall be taken as close as practical to the specified part-load rating points as per Table 3 of the Standard.

_____ _____ For discrete unloading units, verify that the condenser inlet water temperature is based on the measured capacity for the test as per Table 3 of the Standard.

25% Part-Load Test

_____	_____	The Laboratory shall verify that the Test Stand test conditions remain within the allowable tolerances for the duration of the test period.
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The Laboratory shall confirm all following data collected during the test are in accordance with the Standard

- | | | |
|-------|-------|--|
| _____ | _____ | 1.1 Data collected in accordance with Section C6.2.1 of the Standard |
| _____ | _____ | 1.2 Heat balance is within tolerance per Table 13 of the Standard |
| _____ | _____ | 1.3 Evaporator water flow |
| _____ | _____ | 1.4 Leaving Evaporator water temperature |
| _____ | _____ | 1.5 Condenser water flow |
| _____ | _____ | 1.6 Entering Condenser water temperature |
| _____ | _____ | 1.7 Voltage (average of all phases) |
| _____ | _____ | 1.8 Frequency |

The Laboratory shall confirm the calculated IPLV/NPLV is within tolerance at the conclusion of the test in accordance with the Standard

_____	_____	For continuous unloading units during part-load tests, verify the measured capacities are within tolerance ($\pm 2\%$ of the full load rated capacity). For discrete capacity step units, part load test points shall be taken as close as practical to the specified part-load rating points as per Table 3 of the Standard.
_____	_____	For discrete unloading units, verify that the condenser inlet water temperature is based on the measured capacity for the test as per Table 3 of the Standard.

REPRESENTATIVE INITIALS	DATA POINT (IF APPLICABLE)
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Extra Point (Required for instances when previous points cannot be determined due to discrete step machines that are unloaded at different loads)

_____	_____	The Laboratory shall verify that the Test Stand test conditions remain within the allowable tolerances for the duration of the test period.
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The Laboratory shall confirm all following data collected during the test are in accordance with the Standard

- | | | |
|-------|-------|--|
| _____ | _____ | 1.1 Data collected in accordance with Section C6.2.1 of the Standard |
| _____ | _____ | 1.2 Heat balance is within tolerance per Table 13 of the Standard |
| _____ | _____ | 1.3 Evaporator water flow |
| _____ | _____ | 1.4 Leaving Evaporator water temperature |
| _____ | _____ | 1.5 Condenser water flow |
| _____ | _____ | 1.6 Entering Condenser water temperature |
| _____ | _____ | 1.7 Voltage (average of all phases) |
| _____ | _____ | 1.8 Frequency |

The Laboratory shall confirm the calculated IPLV/NPLV is within tolerance at the conclusion of the test in accordance with the Standard

_____	_____	For continuous unloading units during part-load tests, verify the measured capacities are within tolerance ($\pm 2\%$ of the full load rated capacity). For discrete capacity step units, part load test points shall be taken as close as practical to the specified part-load rating points as per Table 3 of the Standard.
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_____	_____	For discrete unloading units, verify that the condenser inlet water temperature is based on the measured capacity for the test as per Table 3 of the Standard.
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Random Operating Point (5th Point)

_____	_____	The Laboratory shall verify that the Test Stand test conditions remain within the allowable tolerances for the duration of the test period.
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The Laboratory shall confirm all following data collected during the test are in accordance with the Standard

- | | | |
|-------|-------|--|
| _____ | _____ | 1.1 Data collected in accordance with Section C6.2.1 of the Standard |
| _____ | _____ | 1.2 Heat balance is within tolerance per Table 13 of the Standard |
| _____ | _____ | 1.3 Evaporator water flow |
| _____ | _____ | 1.4 Leaving Evaporator water temperature |
| _____ | _____ | 1.5 Condenser water flow |
| _____ | _____ | 1.6 Entering Condenser water temperature |
| _____ | _____ | 1.7 Voltage (average of all phases) |
| _____ | _____ | 1.8 Frequency |

The Laboratory shall confirm all of the following at the conclusion of the test are in accordance with the Standard:

- | | | |
|-------|-------|---|
| _____ | _____ | 2.1 Calculated Capacity |
| _____ | _____ | 2.2 Calculated IPLV/NPLV |
| _____ | _____ | 2.3 Calculated Evaporator water pressure drop |
| _____ | _____ | 2.4 Calculated Condenser water pressure drop |

REPRESENTATIVE INITIALS	DATA POINT (IF APPLICABLE)
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Day of Test (contin.)

_____	_____	After the test is completed, calculate the unobtainable points as per the latest edition of the Standard, if applicable.
_____	_____	Calculate the IPLV/NPLV using the appropriate Efficiency values.
_____	_____	The results are then calculated by the Laboratory. The Participant shall be informed of the final test results, and if the sample met the WCCL Certification Program criteria. If the sample fails, the Participant decides the next course of action as per the WCCL Operations Manual, Section 3.11 <i>Test Failures</i> .
_____	_____	The Laboratory test report, along with the raw data obtained from the Laboratory instrumentation, shall be issued to AHRI. The Laboratory shall invoice AHRI and the Participant in accordance with the AHRI/Laboratory Testing Services Agreement.

This checklist & all supporting documents have been reviewed & approved by:

PRINTED NAME OF LABORATORY SUPERVISOR

SIGNATURE OF LABORATORY SUPERVISOR

DATE