

**2005 CERTIFICATE OF ACCEPTANCE (Part 1 of 2)****LTG-1-A**

|                   |           |  |
|-------------------|-----------|--|
| PROJECT NAME      |           | DATE   |
| PROJECT ADDRESS   |           | _____<br>Checked by/Date<br>Enforcement Agency Use |
| TESTING AUTHORITY | TELEPHONE |  |

**GENERAL INFORMATION**

|                       |   |  |   |
|-----------------------|---|--|---|
| DATE OF BLDG. PERMIT  | PERMIT #                                  | BLDG. CONDITIONED FLOOR AREA                   | CLIMATE ZONE                                    |
| BUILDING TYPE         | <input type="checkbox"/> NONRESIDENTIAL   | <input type="checkbox"/> HIGH RISE RESIDENTIAL | <input type="checkbox"/> HOTEL/MOTEL GUEST ROOM |
| PHASE OF CONSTRUCTION | <input type="checkbox"/> NEW CONSTRUCTION | <input type="checkbox"/> ADDITION              | <input type="checkbox"/> ALTERATION             |
|                       |   |  | <input type="checkbox"/> UNCONDITIONED          |

**STATEMENT OF ACCEPTANCE**

This Certificate of Acceptance summarizes the results of the acceptance tests related to building lighting requirements per Title 24, Part 1 (10-103(b)) and Part 6. (Sections 119(d), 119(e), 131(d))

Please check one:

- I hereby affirm that I am eligible under the provisions of Division 3 of the Business and Professions Code to sign this document as the person responsible for it's preparation; and that I am licensed in the State of California as a civil engineer or electrical engineer, or I am a licensed architect.
- I affirm that I am eligible under the exemption to Division 3 of the Business and Professions Code by Section 5537.2 or 6737.3 to sign this document as the person responsible for its preparation; and that I am a licensed contractor performing this work.
- I affirm that I am eligible under the exemption to Division 3 of the business and Professions Code to sign this document because it pertains to a structure or type of work described pursuant to Business and Professions Code sections 5537, 5538, and 6737.1.

(These sections of the Business and Professions Code are printed in full in the Nonresidential Manual.)

|                          |           |      |       |
|--------------------------|-----------|------|-------|
| TESTING AUTHORITY - NAME | SIGNATURE | DATE | LIC.# |
|                          |           |      |       |

**INSTRUCTIONS TO APPLICANT**

*For Detailed instructions on the use of this and all Energy efficiency Standards acceptance forms, please refer to the Nonresidential Manual published by the California Energy Commission.*

Part 1 of 2 - Statement of Acceptance

Part 2 of 2 - Summary of Acceptance Tests

**Ventilation System Acceptance Document**

**NJ.3.1, NJ.3.2**

Form    of   

|                                       |           |  |
|---------------------------------------|-----------|--|
| PROJECT NAME                          |           | DATE   |
| PROJECT ADDRESS                       |           | _____<br>Checked by/Date<br>Enforcement Agency Use |
| TESTING AUTHORITY                     | TELEPHONE |  |
| VENTILATION SYSTEM NAME / DESIGNATION |           |  |

**Intent:** Verify measured outside airflow CFM    within  $\pm 10\%$  of the total required outside airflow value found in the Standards Mechanical Plan (MECH-3-C, Column H or Column I), per 121(f).

**Construction Inspection**

- 1 Instrumentation to perform test includes, but not limited to:
  - a. Watch
  - b. Means to measure airflow (hot wire anemometer or pitot tube)
- 2 Check one of the following:
  - Variable Air Volume (VAV) - Check as appropriate:
    - a. Sensor used to control outdoor air flow must have calibration certificate or be field calibrated
      - Calibration certificate (attach calibration certification)
      - Field calibration (attach results)
  - Constant Air Volume (CAV) - Check as appropriate:
    - System is designed to provide a fixed minimum OSA when the unit is on

**Certification Statement:** I certify that all statements are true on this MECH-2-A form including the PASS/FAIL Evaluation. I affirm I am eligible to sign this form under the provisions described in the Statement of Acceptance on form MECH-1-A

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Ventilation System Acceptance Document

NJ.3.1, NJ.3.2

Form \_\_ of \_\_

|              |      |
|--------------|------|
| PROJECT NAME | DATE |
|--------------|------|

| A. Equipment Testing (Check appropriate column)                                 |   | CAV | VAV |
|---|---|-----|-----|
| a. Verify unit is not in economizer mode during test - check appropriate column |   |     |     |
| <b>Step 1: CAV and VAV testing at full supply airflow</b>                       |   |     |     |
| 1   | Drive boxes open (check)  |     |     |
| 2   | Measured outdoor airflow (cfm)  |     |     |
| 3   | Required outdoor airflow (cfm) (from MECH-3-C, Column I)                |     |     |
| 4   | Time for outside air damper to stabilize after VAV boxes open (minutes) |     |     |
| 5   | Return to initial conditions (check)                                    |     |     |
| <b>Step 2: VAV testing at reduced supply airflow</b>                            |   |     |     |
| 1   | Drive boxes to minimum (check)  |     |     |
| 2   | Measured outdoor airflow (cfm)  |     |     |
| 3   | Required outdoor airflow (cfm) (from MECH-3-C, Column I)                |     |     |
| 4   | Time for outside air damper to stabilize after VAV boxes open (minutes) |     |     |
| 5   | Return to initial conditions (check)                                    |     |     |

| B. Testing Calculations & Results   |  | CAV   | VAV   |
|---|--|-------|-------|
| Step 1: % Outdoor Air = Measured outside air / Required outside air (Step1:2/Step1:3) |  | %     | %     |
| 90% > %Outdoor Air < 110%   |  | Y / N | Y / N |
| Outside air damper position stabilizes within 15 minutes (Step 1:4 < 15 minutes)      |  | Y / N | Y / N |
| Step 2: % Outdoor Air = Measured outside air / Required outside air (Step2:2/Step2:3) |  |       |       |
| 90% > %Outdoor Air < 110%   |  |       | Y / N |
| Outside air damper position stabilizes within 15 minutes (Step 2:4 < 15 minutes)      |  |       | Y / N |

**Note: Shaded boxes do not apply for that particular test procedure**

|   |  |
|---|--|
| <b>C. PASS / FAIL Evaluation (check one):</b> |  |
| <input type="checkbox"/>                      | PASS: All <b>Construction Inspection</b> responses are complete and <b>Testing Calculations &amp; Results</b> responses are positive (Y - yes)   |
| <input type="checkbox"/>                      | FAIL: Any <b>Construction Inspection</b> responses are incomplete OR there is one or more negative (N - no) responses in <b>Testing Calculations &amp; Results</b> section. Provide explanation below. Use and attach additional pages if necessary. |

**Packaged/Split HVAC Systems Acceptance Document**

**NJ.4.1**

Form \_\_\_\_\_ of \_\_\_\_\_

|                                  |           |  |
|----------------------------------|-----------|--|
| PROJECT NAME                     |           | DATE   |
| PROJECT ADDRESS                  |           | _____<br>Checked by/Date<br>Enforcement Agency Use |
| TESTING AUTHORITY                | TELEPHONE |  |
| PACKAGED HVAC NAME / DESIGNATION |           |  |

**Intent:** Verify that under a specific load whether in occupied or unoccupied condition, the system meets a specific sequence of operation.

**Construction Inspection**

- 1 Instrumentation to perform test includes, but not limited to:
  - a. None required
- 2 Installation
  - Thermostat or zone temperature sensor is located within the zone that the HVAC system serves
  - Thermostat or sensor is wired to the HVAC system correctly
- 3 Programming (check **all** of the following)
  - Heating and cooling thermostats are capable of a 5°F deadband where cooling and heating are at a minimum (§122(b)3)
  - Occupied, unoccupied, and holiday schedule have been programmed.
  - Pre-occupancy purge (at least lesser of minimum outside air or 3 ACH for one hour prior to occupancy) programmed (§121(c)2)
  - Set up and set back setpoints have been programmed as required

**Certification Statement:** I certify that all statements are true on this MECH-3-A form including the PASS/FAIL Evaluation. I affirm I am eligible to sign this form under the provisions described in the Statement of Acceptance on form MECH-1-A

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Packaged/Split HVAC Systems Acceptance Document

NJ.4.1

Form \_\_\_\_\_ of \_\_\_\_\_

PROJECT NAME

DATE

B. Equipment Testing Requirements

Operating Modes

|  |  |                                     |  |  |  |                 |  |
|--|--|-------------------------------------|--|--|--|-----------------|--|
|  |  |                                     |  |  |  |                 | Cooling load during unoccupied condition |
|  |  |                                     |  |  |  |                 |  |
| Heating load during unoccupied condition |  | No-load during unoccupied condition |  | Cooling load during occupied condition |  | Manual override |  |
|  |  |                                     |  |  |  |                 | Heating load during occupied condition   |

| Check and verify the following for each simulation mode required |   | A                        | B                        | C                        | D                        | E                        | F                        | G                        |
|--|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/>   | 1 Supply fan operates continually   | <input type="checkbox"/> | <input type="checkbox"/> |                          |                          | <input type="checkbox"/> | <input type="checkbox"/> |                          |
| <input type="checkbox"/>   | 2 Supply fan turns off  |                          |                          |                          | <input type="checkbox"/> |                          |                          |                          |
| <input type="checkbox"/>   | 3 Supply fan cycles on and off  |                          |                          | <input type="checkbox"/> |                          |                          |                          | <input type="checkbox"/> |
| <input type="checkbox"/>   | 4 System reverts to "occupied" mode to satisfy any condition                            |                          |                          |                          |                          | <input type="checkbox"/> |                          |                          |
| <input type="checkbox"/>   | 5 System turns off when manual override time period expires                             |                          |                          |                          |                          | <input type="checkbox"/> |                          |                          |
| <input type="checkbox"/>   | 6 Gas-fired furnace, heat pump, or electric heater stages on                            | <input type="checkbox"/> |                          | <input type="checkbox"/> |                          |                          |                          |                          |
| <input type="checkbox"/>   | 7 Neither heating or cooling is provided by the unit                                    |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |                          |                          |                          |
| <input type="checkbox"/>   | 8 No heating is provided by the unit  |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> |                          | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>   | 9 No cooling is provided by the unit  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          |                          |                          |
| <input type="checkbox"/>   | 10 Compressor stages on   |                          |                          |                          |                          |                          | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>   | 11 Outside air damper is open to minimum position                                       | <input type="checkbox"/> | <input type="checkbox"/> |                          |                          | <input type="checkbox"/> | <input type="checkbox"/> |                          |
| <input type="checkbox"/>   | 12 Outside air damper closes completely   |                          |                          |                          | <input type="checkbox"/> |                          |                          |                          |
| <input type="checkbox"/>   | 13 System returned to initial operating conditions after all tests have been completed: |                          |                          |                          |                          |                          | Y/N                      |                          |

C. Testing Results

| Indicate if Passed (P), Failed (F), or N/A (X), fill in appropriate letter |  | A | B | C | D | E | F | G |
|--|--|---|---|---|---|---|---|---|
|  |  |   |   |   |   |   |   |   |

Note: Shaded areas do not apply for particular test procedure

D. PASS / FAIL Evaluation (check one):

PASS: All **Construction Inspection** responses are complete and all applicable **Testing Results** responses are "Passed" (P)

FAIL: Any **Construction Inspection** responses are incomplete OR there is one or more "Failed" (F) responses in **Testing Results** section. Provide explanation below. Use and attach additional pages if necessary.

**2005 ACCEPTANCE REQUIREMENTS FOR CODE COMPLIANCE**

**MECH-5-A**

**NJ.5.1 Air Distribution Acceptance Document**

**(Part 1 of 3)**

|                                    |               |   |
|------------------------------------|---------------|---|
| PROJECT NAME                       | DATE          | TELEPHONE                                 |
| PROJECT ADDRESS                    |               | Checked by/Date<br>Enforcement Agency Use |
| TESTING AUTHORITY                  |               |   |
| AIR DISTRIBUTOR NAME / DESIGNATION | PERMIT NUMBER |   |

**Intent:** New single zone supply ductwork must be less than 6% leakage rate per §144(k) or §149(b)Di, existing single zone ductwork must be less than 15% leakage or other compliance path per §149(b)Dii or §149(b)E.

**Construction Inspection**

1 Scope of test – New Buildings – this test required on New Buildings only if all checkboxes 1(a) through 1(c) are checked

**Existing Buildings** – this test required if 1(a) through 1(d) are checked  
 Ductwork conforms to the following (note if any of these are not checked, then this test is not required):

|                          |  |
|--------------------------|--|
| <input type="checkbox"/> | 1a) Connected to a constant volume, single zone air conditioners, heat pumps, or furnaces  |
| <input type="checkbox"/> | 1b) Serves less than 5000 square feet of floor area  |
| <input type="checkbox"/> | 1c) Has more than 25% duct surface area located in one or more of the following spaces   |
|                          | - Outdoors   |
|                          | - A space directly under a roof where the U-factor of the roof is greater than U-factor of the ceiling   |
|                          | - A space directly under a roof with fixed vents or openings to the outside or unconditioned spaces  |
|                          | - An unconditioned crawlspace  |
| <input type="checkbox"/> | 1d) A duct is extended or any of the following replaced: air handler, outdoor condensing unit of a split system, cooling or heating coil, or the furnace heat exchanger. |

2 Instrumentation to perform test includes:

a. Duct Blaster

3 Material and Installation. Complying new duct systems shall have a checked box for all of the following categories a through f.

|   |  |
|---|--|
| a. Choice of drawbands (check one of the following) |  |
| <input type="checkbox"/>                            | Stainless steel worm-drive hose clamps   |
| <input type="checkbox"/>                            | UV-resistant nylon duct ties   |
| <input type="checkbox"/>                            | b. Flexible ducts are not constricted in any way   |
| <input type="checkbox"/>                            | c. Duct leakage tests performed before access to ductwork and connections are blocked  |
| <input type="checkbox"/>                            | d. Joints and seams are not sealed with cloth back rubber adhesive tape unless used in combination with Mastic and drawbands |
| <input type="checkbox"/>                            | e. Duct R-values are verified R-8 per 124(a)   |
| <input type="checkbox"/>                            | f. Ductwork located outdoors has insulation that is protected from damage and suitable for outdoor service                   |

**Certification Statement**

I certify that all statements are true on this MECH-5-A form including the PASS/FAIL Evaluation. I affirm I am eligible to sign this form under the provisions described in the Statement of Acceptance on form MECH-1-A

|            |  |       |
|------------|--|-------|
| Name:      |  |       |
| Company:   |  |       |
| Signature: |  | Date: |

# INSTALLER CERTIFICATION

(Part 2 of 3)

MECH-5-A

|              |               |
|--------------|---------------|
| PROJECT NAME | DATE          |
| SITE ADDRESS | PERMIT NUMBER |

**COPY TO: Building Department, Builder, Building Owner at Occupancy, HERS Provider**

## VERIFIED DUCT TIGHTNESS BY INSTALLER

The installing contractor must pressure test every new HVAC systems that meet the requirements of Section 144(k) and every retrofit to existing HVAC systems that meet the requirements of section 149(b)D or E (see Scope of Test under Construction Inspection)

| RATED FAN FLOW (applies to all systems) |  | Measured Values |  |
|---|--|-----------------|--|
| 1                                       | Cooling capacity or for heating only units heating capacity          |                 |  |
|   | a) Cooling capacity (for all units but heating only units) in tons   |                 |  |
|   | b) Heating capacity (for heating only units) kBtu/h                  |                 |  |
| 2                                       | Fan flow calculation   |                 |  |
|   | a) Cooling capacity in tons [ _____ (Line # 1a) x 400 cfm/ton]       |                 |  |
|   | b) Heating only cap. kBtu/h [ _____ (Line # 1b) x (21.7 cfm/kBtu/h)] |                 |  |
| 3                                       | <b>Total calculated supply fan flow 2(a) or 2(b) cfm</b>             |                 |  |

## NEW CONSTRUCTION OR ENTIRE NEW DUCT SYSTEM ALTERATION:

|  |  |   |   |
|--|--|---|---|
| Duct Pressurization Test Results (CFM @ 25 Pa) |  |   |   |
| 4  | Enter Tested Leakage Flow in _____:  |   | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
| 5  | Pass if Leakage Percentage <6%: [ _____ (Line # 4) / _____ (Line # 3)] x 100 | % | <input type="checkbox"/> Pass <input type="checkbox"/> Fail             |

## ALTERATIONS: Pre-existing Duct System with Duct Alteration and/or HVAC Equipment Change-Out

|   |   |  |  |
|---|---|--|--|
| 6 | Enter Tested Leakage Flow in CFM: <b>Pre-Test</b> of Existing Duct System Prior to Duct System Alteration and/or Equipment Change-Out.                |  |  |
| 7 | Enter Tested Leakage Flow in CFM: <b>Final Test</b> of New Duct System or Altered Duct System for Duct System Alteration and/or Equipment Change-Out. |  |  |

## TEST OR VERIFICATION STANDARDS: For Altered Duct System and/or HVAC Equipment Change-Out Use one of the following Three Tests or Verification Standards for compliance:

|    |   |   |   |
|----|---|---|---|
|    |   |   | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |
| 8  | Pass if Leakage Percentage <15%<br>[ _____ (Line # 7) / _____ (Line # 3)] x 100   | % | <input type="checkbox"/> Pass <input type="checkbox"/> Fail             |
| 9  | Pass if Leakage Reduction Percentage >60%<br>Leakage reduction = [1 - [ _____ (Line#7) / _____ (Line#6)]] x 100               | % | <input type="checkbox"/> Pass <input type="checkbox"/> Fail             |
| 10 | Pass if all Accessible Leaks are sealed as confirmed by Visual Inspection and Verification by HERS rater (sampling rate 100%) |   | <input type="checkbox"/> Pass <input type="checkbox"/> Fail             |
|    | <b>Pass if One of Lines #8 through # 10 pass</b>  |   | <input type="checkbox"/> Pass <input type="checkbox"/> Fail             |

## INSTALLER COMPLIANCE STATEMENT

The building was:  Tested at Final  Tested at Rough-in

I, the undersigned, verify that the above diagnostic test results and the work I performed associated with the test(s) is in conformance with the requirements for compliance credit. I, the undersigned, also certify that the newly installed or retrofit Air-Distribution System Ducts, Plenums and Fans comply with Mandatory requirements specified in Section 124 of the 2005 Building Energy Efficiency Standards.

|            |  |          |  |
|------------|--|----------|--|
| Name:      |  |          |  |
| Company:   |  |          |  |
| Signature: |  | Date:    |  |
| License:   |  | Expires: |  |

# INSTALLER CERTIFICATION

(Part 3 of 3)

MECH-5-A

|                       |            |                         |
|-----------------------|------------|-------------------------|
| HERS Rater:           | Telephone: | Sample Group Number:    |
| Certifying Signature: |            | Sample building Number: |
| Firm:                 |            | HERS Provider:          |

**Copies to: Builder, Building Owner at Occupancy, Building Department (wet signature), HERS Provider**

For new buildings the HERS rater must test and field verify the first individual single zone package space conditioning equipment unit of each building. After the first unit passes the builder shall identify a group of up to seven package units in the building from which one sample will be selected for testing. If this first sampled unit fails the HERS rater must pick another package unit from the group for testing. If the second unit in the group does not pass the HERS rater must test all package units in the group.

For existing buildings the HERS rater must pressure test one out of every seven units a contractor changes. Same rules apply for sampling above.

This page must be filled out by the HERS rater for all tested and sampled buildings. If the installer has not tested every system and provided a MECH-5-A to the HERS rater sampling must not occur.

The unit was:  Tested  Approved as part of sample testing but was not tested

As the HERS rater providing diagnostic testing and field verification, I certify that the building identified on this form complies with the diagnostic tested compliance requirements as checked  on this form. The HERS rater must verify the distribution system on every new TESTED system to make sure that it is fully ducted and correct tape is used before a MECH-5-A may be released.

- The installer has provided a completed MECH-5-A for every system in the group
- In new duct systems, where cloth backed, rubber adhesive duct tape is installed, mastic and draw bands are used in combination with cloth backed, rubber adhesive duct tape to seal leaks at duct connections.

| RATED FAN FLOW (applies to all systems) |  | Measured Values |  |
|---|--|-----------------|--|
| 1                                       | Cooling capacity or for heating only units heating capacity                            |                 |  |
|   | a) Cooling capacity (for all units but heating only units) [ _____ tons x 400 cfm/ton] |                 |  |
|   | b) Heating capacity (for heating only units) [ _____ kBtuh x 21.7 cfm/kBtuh]           |                 |  |
| 2                                       | <b>Total calculated supply fan flow 1(a) or 1(b) cfm</b>                               |                 |  |

## NEW CONSTRUCTION OR ENTIRE NEW DUCT SYSTEM ALTERATION:

|   |   |   |                                     |                                     |
|---|---|---|-------------------------------------|-------------------------------------|
| 3 | Duct Pressurization Test Results (CFM @ 25 Pa)<br>Enter Tested Leakage Flow in _____ M: |   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 | Pass if Leakage Percentage <6%: [ _____ (Line # 3) / _____ (Line # 2)] x 100            | % | <input type="checkbox"/> Pass       | <input type="checkbox"/> Fail       |

## ALTERATIONS: Pre-existing Duct System with Duct Alteration and/or HVAC Equipment Change-Out

|   |   |  |  |  |
|---|---|--|--|--|
| 5 | Enter Tested Leakage Flow in CFM: <b>Final Test</b> of New Duct System or Altered Duct System for Duct System Alteration and/or Equipment Change-Out. |  |  |  |
|---|---|--|--|--|

## TEST OR VERIFICATION STANDARDS: For Altered Duct System and/or HVAC Equipment Change-Out, Use one of the following Three Tests or Verification Standards for compliance:

|  |  |   |                               |                               |
|--|--|---|-------------------------------|-------------------------------|
| 6  | Pass if Leakage Percentage <15% [ _____ (Line # 5) / _____ (Line # 2)] x 100   | % | <input type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 7  | For systems certified by the installer as reducing leakage, pass if Leakage Reduction >60%.<br>LeakageReduction = 1 - [ _____ (Line#5 HERSTestedLeakage) / _____ (Line#6 Installer's CertifiedPre - Test Leakage)] x 100 | % | <input type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| 8  | Pass if all Accessible Leaks are sealed as confirmed by Visual Inspection and Verification by HERS rater (sampling rate 100%)  |   | <input type="checkbox"/> Pass | <input type="checkbox"/> Fail |
| <b>Pass if One of Lines # 6 through # 8 pass</b> |  |   | <input type="checkbox"/> Pass | <input type="checkbox"/> Fail |

# 2005 ACCEPTANCE REQUIREMENTS FOR CODE COMPLIANCE

## Hydronic System Control Acceptance Document

MECH-8-A

NJ.10.1 - NJ.10.5

Form 1 of 4

|                                    |           |   |
|------------------------------------|-----------|---|
| PROJECT NAME                       |           | DATE  |
| PROJECT ADDRESS                    |           | Checked by/Date _____<br>Enforcement Agency Use _____ |
| TESTING AUTHORITY                  | TELEPHONE |   |
| HYDRONIC SYSTEM NAME / DESIGNATION |           |   |

**Intent:** Satisfy HVAC water pumping requirements per Section 144(j).

### Construction Inspection

- 1 Instrumentation to perform tests include, but not limited to:
  - a. Differential pressure gauge
  - b. Portable temperature probe
- 2 Variable Flow Controls (VFC) and Automatic Isolation Controls (AIC) Inspection

VFC AIC

- Valve and piping arrangements were installed per the design drawings to achieve the desired control
- 3 Supply Water Temperature Reset Controls Inspection
  - Supply temperature sensors have been calibrated
    - Manufacturer's calibration certificates (attached)
    - Site calibration within 2° F of temperature measurement with reference meter
  - Sensor locations are adequate to achieve accurate measurements
  - Installed sensors comply with specifications
- 4 Water-loop Heat Pump Controls Inspection
  - Valves were installed per the design drawings to achieve equipment isolation requirements
  - All sensor locations comply with design drawings
- 5 Variable Frequency Drive Controls Inspection
  - All valves, sensors, and equipment were installed per the design drawings
  - Pressure sensors are calibrated
    - Manufacturer's calibration certificates (attached)
    - Site calibration within 10% of pressure measurement with reference meter

**Certification Statement:** I certify that all statements are true on this MECH-8-A form including the PASS/FAIL Evaluation. I affirm I am eligible to sign this form under the provisions described in the Statement of Acceptance on form MECH-1-A

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# 2005 ACCEPTANCE REQUIREMENTS FOR CODE COMPLIANCE

## Hydronic System Control Acceptance Document

MECH-8-A

NJ.10.1 - NJ.10.5

Form 2 of 4

|              |      |
|--------------|------|
| PROJECT NAME | DATE |
|--------------|------|

| <b>A. System Type</b>  |   | System ID |   |   |   |   |
|--|---|-----------|---|---|---|---|
|  |   | 1         | 2 | 3 | 4 | 5 |
| 1  | Chilled water   |           |   |   |   |   |
| 2  | Heating hot water   |           |   |   |   |   |
| 3  | Water-loop heat pump loop   |           |   |   |   |   |
| 4  | Other (fill in blank):  |           |   |   |   |   |
| 5  | Other (fill in blank):  |           |   |   |   |   |
| <b>B. Select Acceptance Test (check all tests completed)</b> |   | 1         | 2 | 3 | 4 | 5 |
| <input type="checkbox"/>                                     | Variable Flow Control - Alternate 1 (Flow measurement)                      |           |   |   |   |   |
| <input type="checkbox"/>                                     | Variable Flow Control - Alternate 2 (No flow measurement)                   |           |   |   |   |   |
| <input type="checkbox"/>                                     | Automatic Isolation Controls  |           |   |   |   |   |
| <input type="checkbox"/>                                     | Supply Water Temperature Reset Controls                                     |           |   |   |   |   |
| <input type="checkbox"/>                                     | Water-loop Heat Pump Controls - Alternate 1 (With Flow Meter)               |           |   |   |   |   |
| <input type="checkbox"/>                                     | Water-loop Heat Pump Controls - Alternate 2 (Without Flow Meter)            |           |   |   |   |   |
| <input type="checkbox"/>                                     | (Pump) Variable Frequency Drive Controls - Alternate 1 (With Flow Meter)    |           |   |   |   |   |
| <input type="checkbox"/>                                     | (Pump) Variable Frequency Drive Controls - Alternate 2 (Without Flow Meter) |           |   |   |   |   |

| <b>C. Equipment Testing Requirements</b>  |   | System ID                |                          |                          |                          |                          |
|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Verify and document the following (check applicable tests)                              |   | 1                        | 2                        | 3                        | 4                        | 5                        |
| <b>NJ 10.1 Variable Flow Control - Alternate 1</b>                                      |   |                          |                          |                          |                          |                          |
| Step 1: Open all control valves.  |   |                          |                          |                          |                          |                          |
| a.  | Measured system flow (gpm) GPM =  |                          |                          |                          |                          |                          |
| b.  | Design system flow (gpm) GPM =  |                          |                          |                          |                          |                          |
| c.  | System operation achieves design conditions                               | <input type="checkbox"/> |
| Step 2: Initiate closure of control valves  |   |                          |                          |                          |                          |                          |
| a.  | Measured system flow (gpm) GPM =  |                          |                          |                          |                          |                          |
| b.  | Design system flow (gpm) GPM =  |                          |                          |                          |                          |                          |
| c.  | Design pump flow control strategy achieves flow reduction requirements    | <input type="checkbox"/> |
| d.  | Ensure all valves operate correctly against the system pressure           | <input type="checkbox"/> |
| Step 3: System returned to initial operating conditions                                 |   | Y / N                    | Y / N                    | Y / N                    | Y / N                    | Y / N                    |
| <b>NJ.10.1 Variable Flow Control- Alternate 2</b>                                       |   |                          |                          |                          |                          |                          |
| Step 1: Drive all valves shut and dead head pump against manual isolation valve         |   |                          |                          |                          |                          |                          |
| a.  | Measured pressure across the pump (ft. H2O) ΔP=                           |                          |                          |                          |                          |                          |
| Step 2: Open manual isolation valve and measure pump DP with control valves closed      |   |                          |                          |                          |                          |                          |
| a.  | Measured pressure across the pump (ft. H2O) ΔP=                           |                          |                          |                          |                          |                          |
| b.  | Both shutoff pressures are within +/- 5% of each other                    | <input type="checkbox"/> |
| Step 3: System returned to initial operating conditions                                 |   | Y / N                    | Y / N                    | Y / N                    | Y / N                    | Y / N                    |
| <b>NJ.10.2 Automatic Isolation Controls</b>   |   |                          |                          |                          |                          |                          |
| Step 1: Drive all valves shut and dead head pump against manual isolation valve         |   |                          |                          |                          |                          |                          |
| a.  | Measured pressure across the pump (ft. H2O) ΔP=                           |                          |                          |                          |                          |                          |
| Step 2: Open manual isolation valve and start/stop each chiller or boiler one at a time |   |                          |                          |                          |                          |                          |
| a.  | Verify automatic isolation valve opens fully when respective unit is ON   | <input type="checkbox"/> |
| b.  | Verify automatic isolation valve closes fully when respective unit is OFF | <input type="checkbox"/> |
| Step 3: Stop all chillers and boilers on the hydronic loop                              |   |                          |                          |                          |                          |                          |
| a.  | Measured pressure across the pump (ft. H2O) ΔP=                           |                          |                          |                          |                          |                          |
| b.  | Both shutoff pressures (1a and 3a) are within +/- 5% of each other        | <input type="checkbox"/> |
| Step 4: System returned to initial operating conditions                                 |   | Y / N                    | Y / N                    | Y / N                    | Y / N                    | Y / N                    |

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|  |   |       |                          |                          |                          |                          |
|--|---|-------|--------------------------|--------------------------|--------------------------|--------------------------|
| PROJECT NAME   |   | DATE  |                          |                          |                          |                          |
| <b>NJ.10.3 Supply Water Temperature Reset Controls</b>   |   |       |                          |                          |                          |                          |
| Step 1: Manually change design control variable to maximum setpoint                            |   |       |                          |                          |                          |                          |
| a.   | Reset temperature setpoint  | °F =  |                          |                          |                          |                          |
| b.   | Measured water temperature  | °F =  |                          |                          |                          |                          |
| c.   | Water temperature setpoint is reset to appropriate value                      |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d.   | Actual water supply temperature meets setpoint                                |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 2: Manually change design control variable to minimum setpoint                            |   |       |                          |                          |                          |                          |
| a.   | Reset temperature setpoint  | °F =  |                          |                          |                          |                          |
| b.   | Measured water temperature  | °F =  |                          |                          |                          |                          |
| c.   | Water temperature setpoint is reset to appropriate value                      |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d.   | Actual water supply temperature meets setpoint                                |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 3: System returned to initial operating conditions  |   |       | Y/N                      | Y/N                      | Y/N                      | Y/N                      |
| <b>NJ.10.4 Water-loop Heat Pump Controls (for circulation pumps &gt; 5 hp) - Alternate 1</b>   |   |       |                          |                          |                          |                          |
| Step 1: Open all control valves  |   |       |                          |                          |                          |                          |
| a.   | Measured system flow (gpm)  | GPM = |                          |                          |                          |                          |
| b.   | Design system flow (gpm)  | GPM = |                          |                          |                          |                          |
| c.   | System operation achieves design conditions +/- 5% (Step 1.a./Step 1.b.)      |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 2: Initiate shut-down sequence on each individual heat pumps                              |   |       |                          |                          |                          |                          |
| a.   | Isolation valves close automatically upon unit shut-down                      |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b.   | Ensure all valves operate correctly at shut-off system pressure conditions    |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c.   | System flow reduced for each individual heat pump shut down                   |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 3: System returned to initial operating conditions  |   |       | Y/N                      | Y/N                      | Y/N                      | Y/N                      |
| <b>NJ.10.4 Water-loop Heat Pump Controls (for circulation pumps &gt; 5 hp) - Alternate 2</b>   |   |       |                          |                          |                          |                          |
| Step 1: Drive all valves shut and dead head pump against manual isolation valve                |   |       |                          |                          |                          |                          |
| a.   | Measured pressure across the pump (ft. H2O)                                   | ΔP=   |                          |                          |                          |                          |
| Step 2: Open manual isolation valve and measure pump DP with automatic isolation valves closed |   |       |                          |                          |                          |                          |
| a.   | Measured pressure across the pump (ft. H2O)                                   | ΔP=   |                          |                          |                          |                          |
| b.   | Both shutoff pressures are within +/- 5% of each other                        |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 3: System returned to initial operating conditions  |   |       | Y/N                      | Y/N                      | Y/N                      | Y/N                      |
| <b>NJ.10.5 (Pump) Variable Frequency Drive Controls - Alternate 1 (With Flow Meters)</b>       |   |       |                          |                          |                          |                          |
| Step 1: Open all control valves  |   |       |                          |                          |                          |                          |
| a.   | Measured system flow (gpm)  | GPM = |                          |                          |                          |                          |
| b.   | Design system flow (gpm)  | GPM = |                          |                          |                          |                          |
| c.   | Design pump power (estimated by motor HP/ motor efficiency x 0.746 kW/HP)     |       | kW =                     |                          |                          |                          |
| d.   | System operation achieves design conditions +/- 5% (Step 1.a./Step 1.b.)      |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e.   | VFD operates near 100% speed at full flow                                     |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 2: Modulate control valves closed   |   |       |                          |                          |                          |                          |
| a.   | Ensure all valves operate correctly at system pressure conditions             |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b.   | Witness proper response from VFD (speed decreases as valves close)            |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c.   | Time for system to stabilize  |       | Min =                    |                          |                          |                          |
| d.   | System operation stabilizes within 5 min. after test procedures are initiated |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 3: Adjust system operation to achieve 50% flow  |   |       |                          |                          |                          |                          |
| a.   | Measured system flow (gpm)  | GPM = |                          |                          |                          |                          |
| b.   | Measured pump power at full flow  |       | kW =                     |                          |                          |                          |
| c.   | %Power = part load kW/full load design kW (Step 3.b. / Step 1.c.)             |       | % =                      |                          |                          |                          |
| d.   | VFD input power less than 30% of design                                       |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 4: Adjust to achieve flow rate where VFD is below min speed setpoint                      |   |       |                          |                          |                          |                          |
| a.   | VFD minimum setpoint  |       | Hz =                     |                          |                          |                          |
| b.   | Ensure VFD maintains minimum speed setpoint                                   |       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Step 5: System returned to initial operating conditions  |   |       | Y/N                      | Y/N                      | Y/N                      | Y/N                      |

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|  |  |
|--|--|
| PROJECT NAME   | DATE   |
| <b>NJ.10.5 (Pump) Variable Frequency Drive Controls - Alternate 2 (Without Flow Meters)</b>                  |  |
| Step 1: Open all control valves  |  |
| a. Visually inspect a few valves to verify that they open  |  |
| b. Time for system to stabilize <span style="float: right;">Min =</span>                                     |  |
| c. System operation stabilizes within 5 min. after test procedures are initiated                             | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| d. VFD operates near 100% speed at full flow   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| e. Measured pressure at loop pressure sensor control point <span style="float: right;">(psi or ft WC)</span> |  |
| Step 2: Modulate control valves closed   |  |
| a. Visually inspect a few valves to verify that they close   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| b. Witness proper response from VFD (speed decreases as valves close)  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| c. Time for system to stabilize <span style="float: right;">Min =</span>                                     |  |
| d. System operation stabilizes within 5 min. after test procedures are initiated                             | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| e. Measured pressure at loop pressure sensor control point <span style="float: right;">(psi or ft WC)</span> |  |
| f. Measured pressure with valves closed $\leq$ pressure with valves open                                     | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Step 3: System returned to initial operating conditions  | Y/N   Y/N   Y/N   Y/N   Y/N  |

**D. PASS / FAIL Evaluation (check one):**

|                          |   |
|--------------------------|---|
| <input type="checkbox"/> | PASS: All applicable <b>Construction Inspection</b> responses and applicable <b>Equipment Testing Requirements</b> are complete.  |
| <input type="checkbox"/> | FAIL: Any applicable <b>Construction Inspection</b> responses are incomplete <i>OR</i> there is one or more unchecked box for an applicable test in the <b>Equipment Testing Requirements</b> section. Provide explanation below. Use and attach additional pages if necessary. |
|                          |   |