

**INSTALLER and INSPECTOR QUICK-REFERENCE:
2022 NRCA-MCH-08-A
Valve Leakage Acceptance**

Purpose and Scope of the Test

This test ensures that control valves serving variable flow systems are designed to withstand the pump pressure over the full range of operation. Valves with insufficient actuators will lift under certain conditions causing water to leak and loss of flow control. This test applies to the variable flow systems covered by section 140.4(k)1 chilled and hot-water variable flow systems, section 140.4(k)2 chiller isolation valves, section 140.4(k)3 boiler isolation valves, and section 140.4(k)5 water-cooled air conditioner and hydronic heat pump systems.

Test trigger

Newly Constructed and Additions/Alterations: Applies to chilled and hot water systems that are designed for variable flow. It also applies to new boilers and chillers where there is more than one boiler or chiller in the plant and the primary pumps are connected to a common header.
This test is required for systems that are designed with variable flow for HVAC chilled and hot water pumping that include more than three control valves, and a total of more than 1.5 horsepower. The test addresses chiller isolation valves, boiler isolation valves, and water-cooled air conditioner and hydronic heat pump systems.

Relevant Energy Code References and Required Compliance Documents

Title 24, Part 6 of the California Building Code, Building Energy Efficiency Standards (Energy Code) sections 140.4(k)1, 140.4(k)2, 140.4(k)3, 140.4(k)5; NA7.5.7; NRCC-MCH-E Tables F and G.

Related acceptance tests for these systems include the following:

- NA7.5.9 Hydronic System Variable Flow Controls Acceptance.

Testing time will be greatly reduced if these acceptance tests are done simultaneously.

Who Can Perform the Test

This test must be performed by an acceptance test technician certified by a CEC-approved Acceptance Test Technician Certification Provider, using compliance document NRCA-MCH-08-A.

Required Tools

Performance of this test will require measuring differential pressure across pumps. The instrumentation needed to perform the test may include, but is not limited to either a:

- Differential pressure gauge.
- Handheld hydronic manometer.

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Required Tools

For accurate comparison with the pump curves, measure using the taps on the pump casing. Taps on the inlet and discharge piping to the pumps will not correlate to the pump curves.

Estimated Time to Complete Test

Construction Inspection: 0.5 to 2 hours (depending on availability of construction documentation and complexity of the system.)

Functional testing: 0.5 to 3 hours (depending on the complexity of the system and the number of valves).

Potential Issues and Cautions

The Acceptance Agent will likely need access to the energy management control system (EMCS) during testing.

Running a pump in a "dead head" condition (no flow) for more than 5 minutes can damage the pump seals or motor. Care must be taken to set up the test so that the pump only needs to run for 5 minutes or less.

If balance valves are used for isolation of three-way valves or pumps, their initial position must be noted prior to using them for shutting off flow so that they can be returned to their initial position at the end of the test.

Inspection Enforcement

The whole hydronic system must be complete - all coils, control valves, and pumps installed; all piping is pressure tested, flushed, cleaned, filled with water; and EMCS controls, if applicable.

All equipment start-up procedures are complete, per manufacturer's recommendations.

Document the initial conditions before overrides or manipulation of the BAS. All systems must be returned to normal at the end of the test.

- Verify that valve and piping arrangements are installed as specified by the design drawings.

Acceptance Criteria

- Verify that the leakage across the pump isolation valves is calculated to be between -5 percent and +5 percent.
- Verify that the total leakage across all the system valves, including bypass lines, is calculated to be between -5 percent and +5 percent.