Step 3: Observe and record the states of each compressor and the current air demand during the test.

Fill out the table for Step 3 in Document NRCA-PRC-01-A. If any state is difficult to determine, then document your specific observations and measurements in the Notes section.

Step 4: Confirm that the system exhibits the following behavior following the test:

- No compressor exhibits short-cycling.

  If any compressor was cycling between loaded and unloaded during the test, and if the number of on-off cycles exceeds 10, this portion of the test fails. Circle N in Document NRCA-PRC-01-A.

- No compressor exhibits blowoff.

  If any compressor is venting pressurized air to the atmosphere, this portion of the test fails. Circle N in Document NRCA-PRC-01-A

- The trim compressors are the only compressors partially loaded, while the base compressors will either be fully loaded or off by the end of the test. (only applicable for new systems)

  This is a requirement for new systems because these systems are required to have properly sized trim compressors. If the new systems are designed properly, the controls should operate in a manner that has the trim compressors responsible for the trim load on top of fully loaded base compressors.

  If any compressor is in the Partially Loaded state that is not a trim compressor, this portion of the test fails. Circle N in Document NRCA-PRC-01-A.

  For an existing system, circle NA in NRCA-PRC-01-A.

Step 5: Return system to initial operating conditions.

13.29 NRCA-PRC-02-A: Commercial Kitchen Exhaust

At-A-Glance

NA7.11.1 Commercial Kitchen Exhaust
Use Document NRCA-PRC-02-A
Purpose of the Test
The following acceptance tests apply to commercial kitchen exhaust systems with Type I exhaust hoods. All Type I exhaust hoods used in commercial kitchens shall be tested.
Instrumentation
Smoke candles or smoke puffers (smoke bombs are not permitted), actual cooking at the normal production rate is also a reliable method of generating smoke. Space differential pressure sensor. Recording Analog Manometer with Pitot Tube and VelGrid.
Test Conditions
Exhaust and make-up air systems are installed and fully functional. Demand Ventilation Control systems (if installed) are fully functional and have been set up and calibrated by the installing contactor.

For Kitchens with greater than 5,000 cfm of Type I and Type II kitchen hood exhaust, All Type I hoods meet the requirements of Table 140.9-A.
Estimated Time to Complete
Construction inspection: 0.5 hour **Functional testing:** 1 hour (for each system)
Acceptance Criteria
• Smoke was fully captured. • All Type I hoods are drawing exhaust at less than or equal to the values in Table 140.9-A. • DCV and MUA system respond. • Timed override works • DCV and MUA systems respond to full load conditions (all Yes)
Potential Issues and Cautions
Coordinate test procedures with the facility supervisor since they may be needed to assist with the manipulation of the control system.

A. Test Application

Newly Constructed and Additions/Alterations: All newly installed Type 1 exhaust hoods used in commercial kitchens must be tested.

B. Construction Inspection

Verify exhaust and replacement air systems are installed, power is supplied and the control systems such as demand control ventilation are calibrated.

For kitchen/dining facilities having total Type 1 and Type II kitchen hood exhaust airflow rates greater than 5,000 cfm, calculate the maximum allowable exhaust rate for each Type 1 hood per Table 140.9-A.

C. Functional Testing

The following acceptance test applies to systems with and without demand control ventilation exhaust systems. These tests shall be conducted at full load conditions.

Step 1: Operate all sources of outdoor air providing replacement air for the hoods.

Step 2: Operate all sources of recirculated air providing conditioning for the space in which the hoods are located.

Step 3: Operate all appliances under the hoods at operating temperatures.

Step 4: Verify that the thermal plume and smoke is completely captured and contained within each hood at full load conditions by observing smoke or steam produced by actual cooking operation and/or by visually seeding the thermal plume using devices such as smoke candles or smoke puffers. Smoke bombs shall not be used (note: smoke bombs typically create a large volume of effluent from a point source and do not necessarily confirm whether the cooking effluent is being captured). For some appliances (e.g., broilers, griddles, fryers), actual cooking at the normal production rate is a reliable method of generating smoke). Other appliances that typically generate hot moist air

without smoke (e.g., ovens, steamers) need seeding of the thermal plume with artificial smoke to verify capture and containment.

Step 5: Verify that space pressurization is appropriate (e.g. kitchen is slightly negative relative to adjacent spaces and all doors open/close properly).

Step 6: Verify that each Type 1 hood has an exhaust rate that is below the maximum allowed.

Step 7: Make adjustments as necessary until full capture and containment and adequate space pressurization are achieved and maximum allowable exhaust rates are not exceeded. Adjustments may include:

- Adjust exhaust hood airflow rates.
- Add hood side panels.
- Add rear seal (back plate).
- Increase hood overhang by pushing equipment back.
- Relocate supply outlets to improve the capture and containment performance.

Step 8: Measure and record final exhaust airflow rate per Type 1 hood.

The following additional acceptance test shall be performed on all exhaust hoods with demand control ventilation exhaust systems.

Step 1: Turn off all kitchen hoods, makeup air and transfer systems.

Step 2: Turn on one of the appliances on the line and bring to operating temperature. Confirm that:

1. DCV system automatically switches from off to the minimum flow setpoint.
2. The minimum flow setpoint does not exceed the larger of:
    - 50 percent of the design flow.
    - The ventilation rate required per §120.1.
3. The makeup air and transfer air system flow rates modulate as appropriate to match the exhaust rate.
4. Appropriate space pressurization is maintained.

Step 3: Press the timed override button. Confirm that system ramps to full speed and back to minimum speed after override times out.

Step 4: Operate all appliances at typical conditions. Apply sample cooking products and/or utilize smoke puffers as appropriate to simulate full load conditions. Confirm that:

1. DCV system automatically ramps to full speed.
2. Hood maintains full capture and containment during ramping to and at full-speed.
3. Appropriate space pressurization is maintained.