

Section 10

Air Leakage Test (Through Panel Seams)

Purpose:

To determine the rate at which air will pass through the cracks and gaps in an access floor panel assembly, at a specified and controlled differential static air pressure. This test applies only to floors used for underfloor air distribution.

Preparation:

1. The test shall be performed on a specimen of panels in a relatively airtight box or chamber, as shown below. The gap between the perimeter of the floor panels and the chamber opening shall be sealed to minimize air leakage.
2. The dimensions of the panel assembly shall be at least 72 inches (1829 mm) square. Finished floor height shall be 12 inches (305 mm), or the maximum height of the system; whichever is less.
3. Any coatings, stringers, gaskets, pads, clips, fasteners, or other materials normally used shall be identical to that utilized in an installed system. The pedestals shall be anchored to the base of the chamber only if such anchorage will affect the air leakage rate in some way. If so, such anchorage shall be described in the report.
4. A controllable blower, fan, or air pump shall be fitted to the chamber to supply airflow to the chamber at a rate sufficient to maintain the positive air pressure required. The system should provide essentially constant airflow for a period of time sufficient to obtain readings of airflow rate and pressure.
5. A flowmeter or other suitable device to measure the rate of airflow into the test chamber shall be fitted.
A manometer or other suitable device to measure the differential test pressures shall be connected between the chamber and atmosphere.

Note: The referenced test method, ASTM E283, requires the device be capable of recording the pressure within $\pm 2\%$ of setpoint. The static air pressure differentials typically employed in under floor air distribution systems are much lower than in the referenced method, so care must be taken by the test agency to employ the appropriate pressure measuring device.

Test Procedure:

1. Calibrate the air leakage test equipment in accordance with the calibration instructions in ASTM E283 Standard Test Method For Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen, except that the calibration pressure shall be 0.10 inch of water column (25 Pa).
2. With the floor specimen installed as described above, adjust the total airflow into the chamber to provide the specified test pressure difference across the test specimen. When the test conditions have stabilized, record the airflow through the flowmeter, and the test pressure difference. This

measured air flow is designated the total air flow, $Q_t(p)n$, where p is the pressure, and n is the number of the measurement. Measure the barometric pressure, B , and temperature of the air at the test specimen, T .

3. Repeat the measurement of the leakage at each pressure level at least 4 times. Calculate the arithmetic average of all leakage measurements at each pressure, $Q_t(p)$.
4. Seal all gaps and holes in the floor specimen.
5. With the floor specimen sealed, measure the amount of air leakage through the test chamber itself, at the same air pressure differentials as in step 2. Each measured air flow is designated the extraneous airflow, $Q_e(p)n$.
6. Repeat the measurement of the extraneous leakage at each pressure the same number of times as in step 3. Calculate the arithmetic average of all extraneous leakage measurements at each pressure, $Q_e(p)$.
7. Measure the total crack length between the access floor panels, l . Do not include any of the joints between the perimeter of the specimen and the chamber.

The Calculation:

1. Calculate ratio A_p/l_p , where:
 A_p = Area of a floor panel, ft^2 (m^2)
 l_p = Perimeter of a single floor panel, ft (m)

Note: For some systems, where multiple panel sizes or shapes are employed together in one floor assembly, determination of l_p may require more careful analysis. Generally, the perimeter of each panel should be measured only once in determining l_p .

2. Express the total average air flow at each pressure $Q_t(p)$, and the extraneous average air flow at each pressure $Q_e(p)$, in terms of flow at standard conditions, as outlined in ASTM E283.

Note: Ensure all units of measure referenced in the E283 calculation are observed, and that the correct equation is employed.

3. Express the air leakage through the test specimen at each pressure, $Q_s(p)$, as
 $Q_s(p) = Q_t(p) - Q_e(p)$, ft^3/min (L/s) (1)
4. Calculate the rate of air leakage per unit crack length at each pressure, $q_l(p)$, as
 $q_l(p) = Q_s(p)/l$, $\text{ft}^3/\text{min-ft}$ (L/s-m) (2)
5. Calculate the rate of air leakage per unit area at each pressure, $q_A(p)$, as
 $q_A(p) = q_l(p) / [2 (A_p/l_p)]$, $\text{ft}^3/\text{min-ft}^2$ (L/s-m^2) (3)

Report:

1. Reference of testing procedure described herein by Cisca A/F section number shall be included in the report.
2. All apparatus, equipment, instrumentation, accuracy ranges, etc., shall be described including equipment calibration/certification dates.
3. Materials tested, and specimen configuration(s) should be fully described in text and/or photograph and/or drawing, or by reference to manufacturer's drawings and/or part numbers, including the following:

Panels:

- Floor finishes
- Materials of panel construction
- Weight, nominal dimensions and thicknesses

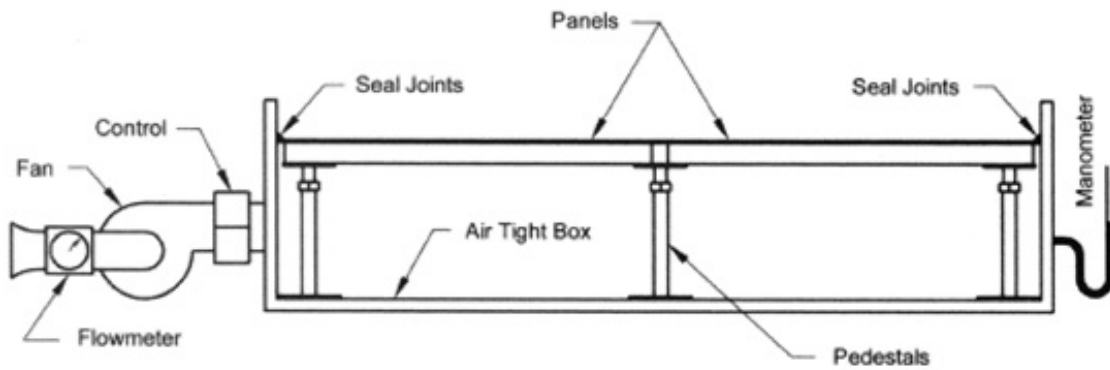
Supporting structure:

- Height
- Materials, sections, fasteners, adhesives or other anchors

Other:

- Fully describe other materials used in the mock-up

4. For each of test pressures, report the rate of air leakage per unit crack length, and per unit area, as noted. At a minimum, report the air leakage rate at the pressures noted in the table. Other pressures may also be reported, at the discretion of the proponent or authority.
5. Calculated accuracy of the measured air leakage, based on the precision of the air pressure measurement.



SETUP FOR AIR LEAKAGE TEST

(Fig. 8)