Testing Installations

Overview

1. **Vent Test Installations**
    a. Based on size and shape, height and length, minimum clearance to combustible construction, enclosure in stud space, and single or multistory building/buildings.

    b. Room should have ventilation capable of controlling the build-up of carbon monoxide to less than 50 parts per million throughout the test. Room must be free of extraneous drafts and the vent is to exhaust into the same space or into a space freely communicating with the space from which the combustion air is taken. Room must not increase by more than 20^{o}F above the room temperature recorded at the beginning of the test.

    c. Vertically installed vents should be totally encased for its full height within all stories and attic space. Should be tested on the basis of clearance from the enclosure as specified by installation instructions. Vent enclosure material is to be 3/8 inch thick plywood (painted flat black), and closed at each floor-joist level by the installation of a firestop.
2. **Temperature Measurement**
    a. Temperatures are to be measured using Type J or Type K thermocouples of 18 – 24 AWG wire and should be inserted into the center of the vent pipe.

    b. For testing temperatures on surfaces thermocouples are to be attached using solder, metal screws, or a weld.

3. **Temperature Test – Structure**
    a. Max temperature should be no more than:
        i. 177 F above ambient temperature on exposed surfaces of the test enclosure
        ii. 90F above ambient temperature on concealed surfaces of the test enclosure, such as within the vent enclosure.
    b. Temp measured on the inner and outer surface of any polymeric part shall not exceed the relative thermal index for the material employed, as specified in the Standard of Polymeric Materials. (UL 746B)

    c. The temperature of the vent gases or heated air entering the test venting system is to be adjusted to 70F above the rated temperature at the minimum input specified.

    d. Vent gas or heated air input is to be continued until equilibrium temperatures are attained. Equilibrium temperatures are considered to have been attained when three successive readings take at 15 minute intervals show no change or show a decrease.

Temperature Rating Table

Nominal diameter Of vent Inches	mm	Rated temperature, and minimum vent input 210F Minimum vent-gas BTU/hr	Minimum heat producing assembly kW	300F Minimum vent-gas generator input BTU/hr	Minimum heat producing assembly input kW
2	51	1900	0.57	2200	0.64
3	76	4277	1.25	4950	1.45
4	102	7605	2.23	8800	2.58
5	127	11882	3.48	13750	4.03
6	152	17103	5.01	19790	5.80
		330F		400F	
2	51	2320	0.68	2513	0.74
3	76	5190	1.52	5655	1.66
4	102	9320	2.73	10056	2.95
5	127	14340	4.20	15712	4.60
6	152	21170	6.20	22616	6.63
		330F		400F	
2	51	2830	0.83	3142	0.92
3	76	6350	1.86	7070	2.07
4	102	11300	3.31	12570	3.68
5	127	17600	5.16	19640	5.76
6	152	25300	7.41	28270	8.29

4. **Draft loss test**
    a. Cap or vent termination is to be mounted on a continuous length of vent pipe or on its roof assembly mounted, in turn, on a continuous length of vent pipe.

b. Static pressure is to be determined by a pilot tub, pressure tap, or a piezometer ring located 12 inches below the point of cap attachment. Pressure readings need to be to the nearest 0.001 inch of water column.
c. Cap or vent removed, air velocity of 10 feet per second is to be established and static pressure measured. Cap is then placed, air velocity of 10 feet per second and static pressure measured. The difference should not exceed 0.034 inch water column.

5. **Wind effects test**
    a. Vent is to be placed in front of wind generator and wind front should be at 20 mph. The cap or vent termination should remain centered in the wind front during rotation about any axis.
    b. The wind front should be directed 45 degrees below and above the vent termination or cap in 15 degree intervals for vertical terminations. If horizontal wind front should be directed at the cap or termination at a series of projected angles ranging from 0 – 90 degrees perpendicular to the vent axis, in 15 degree intervals.
6. **Vertical support test**
    a. Support should be installed as instructed. Venting system should be placed on support and loaded with weight. Max static load applied is to be equal to four times the load imposed by the heaviest assembly for min. 60 minutes.
7. **Impact test**
    a. A 20-50 pound sand bag should be hung on a pendulum and raised an elevation of 9-18 inches and released.
    b. For horizontal - One impact should be perpendicular to the termination and two impacts – each perpendicular but at the vent termination and 180 degrees apart from each other.
    c. For vertical – One impact at the level of a joint, one at the level halfway above the first joint and the next joint, and one impact at the same level as 1, rotated around the axis of the venting system by 90 degrees from the impact of 1.
8. **Load test for vent elbows**
    a. A vertical load, equivalent to four times the weight of the longest supported section of the venting system that is intended to be attached to the elbow, or a load of 10 pounds-mass, whichever is greater, is to be applied through the center of gravity of the section. The load is to be sustained for 5 minutes. The same test is to be used for vent joints.
9. **Wind Load Test**
    a. Test should be done for roof installations and lateral supports. Assembly should withstand a load equivalent to 30 pound per square foot. A load equivalent to the product of the projected area, multiplied by 30 pounds per square foot and expressed in pounds-force, or 50 pounds-force, whichever is greater. The load is to be sustained for 60 minutes.
10. **Rain Test**
    a. The quantity of water entering the vent gas conduit shall not exceed 2% of that which would enter the conduit if unprotected by a cap. The roof assembly is to be sealed or flashed into a roof section of watertight material. An apparatus of 3 spray heads should be directed toward the top and side of the cap or roof assembly. Rain test should last 1 hour.

11. Pressure Test

a. Installations shall withstand without rupture an internal air pressure of 2-1/2 times the manufacturer's rated positive pressure, but not less than 1-1/4 inch water column.

b. The air pressure in the test sample is to be maintained at the designated test pressure for 1 hour. Disregard movement due to slack or stretch that does not produce a separation of materials.