State of Ohio Weatherization Program Standards	Section	DIAGNOSTIC TESTING METHODS
	Subject	Building Tightness Limits (BTL)

BUILDING TIGHTNESS LIMITS (BTL) 1506-10.1

intention
1506-10.1a

The calculated BTL is intended to prevent the over tightening of buildings. Similar to the OVERALLS (NO WORK) range, if a home is below its BTL, this does not mean that no work should be done. Conductive heat loss measures, heating system work, forced-air sealing and balancing, along with ventilation assessment and corrective actions should still be accomplished. **Regardless of the Building Tightness Limits calculated, air sealing shall not be undertaken if the house has an indoor air quality problem that has not or can not be remedied.**

N-VALUE 1509-10.2

calculating n-value
1506-10.2a

Calculate the building's N value. The N value is determined using the Lawrence Berkeley Laboratory (LBL) correlation factors for height, wind shielding and climate correlation. In Ohio, the climate correlation factor will be 18.5. Basements and attics will not be counted as stories unless they are finished and are used as a living space. If finished, a basement will usually be considered a ½ story unless all of the basement walls are exposed. An attic will be considered a full story unless the square footage is less than 50% of the floor below. Windshielding factor is based on the blower door values.

The calculation for the N value is as follows:

N = Height factor x Wind Shielding factor x Climate factor

n-values with climate factor of 18.5
1506-10.2b

# of stories					
windshield	1	1.5	2	2.5	3
shielded(1.2)	22.2	20.0	17.8	16.4	15.5
normal (1.)	18.5	16.7	14.8	13.7	13.0
exposed (.9)	16.7	15.0	13.3	12.3	11.7

ACCEPTABLE METHODS 1506-10.3

method 1 (BTL based on 15 CFM)
1506-10.3a

The first method is a BTL based on 15 CFM_n per person, i.e. 15 cubic feet per minute of natural infiltration per person. This method assures that there is proper ventilation for the occupants and is based on the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 62-1989.

rules
1506-10.3a.i

BTL @ 15CFM_n/person = 15 x number of people x N

The following rules apply to this calculation:

a. Minimum number of people is 5.

b. Add one person to the total for every smoker.

c. Add one person for every pet or group of pets over 75 pounds.

d. Do not use this method if the building's square footage exceeds 320 ft^2 per person.

completed charts
1506-10.3a.ii

5 occupants

	# of stories				
windshield	1	1.5	2	2.5	3
shielded	1665	1500	1335	1230	1163
normal	1388	1253	1110	1028	975
exposed	1253	1125	998	923	878

6 occupants

	# of stories				
windshield	1	1.5	2	2.5	3
shielded	1998	1800	1602	1476	1395
normal	1665	1503	1332	1233	1170
exposed	1503	1350	1197	1107	1053

7 occupants

# of stories					
windshield	1	1.5	2	2.5	3
shielded	2331	2100	1869	1722	1628
normal	1943	1754	1554	1439	1365
exposed	1754	1575	1397	1292	1229

8 occupants

# of stories					
windshield	1	1.5	2	2.5	3
shielded	2664	2400	2136	1968	1860
normal	2220	2004	1776	1644	1560
exposed	2004	1800	1596	1476	1404

method 2 (BTL based on .35 ACH_n)
1506-10.3b

The second method is a BTL based on .35 ACH_n, i.e. .35 Air Changes per hour of natural infiltration. This method focuses on assuring ventilation for the building when the building itself is large enough to become a significant source of pollution.

BTL @ .35 ACH_n = (.35 x Volume x N) / 60

rules
1506-10.3b.i

The following rules apply to this calculation:

a. Use if the building's square footage exceeds 320 ft^2 per person.

b. The basement should not be included in the volume unless it is a living space.

c. The deciding factor is the volume of the building.

method 3 (BTL based on estimated depressurization
1506-10.3c

The third method is based on estimating the exhaust potential of all devices located in the home. These devices are defined as mechanical equipment or combustion appliances which exhaust through a vent connected to the outside of the envelope and which draws air from the living space. This method allows the inspector to determine when a greater than 5 Pascal negative pressure can be produced in the building. A negative pressure greater than 5 Pascal increases the potential for back drafting.

locate and record devices
1506-10.3c.i

Locate and record all devices located in the building. Use Table 1506-103c.i to record the effective flow of the devices.

Table 1506-10.3c.i

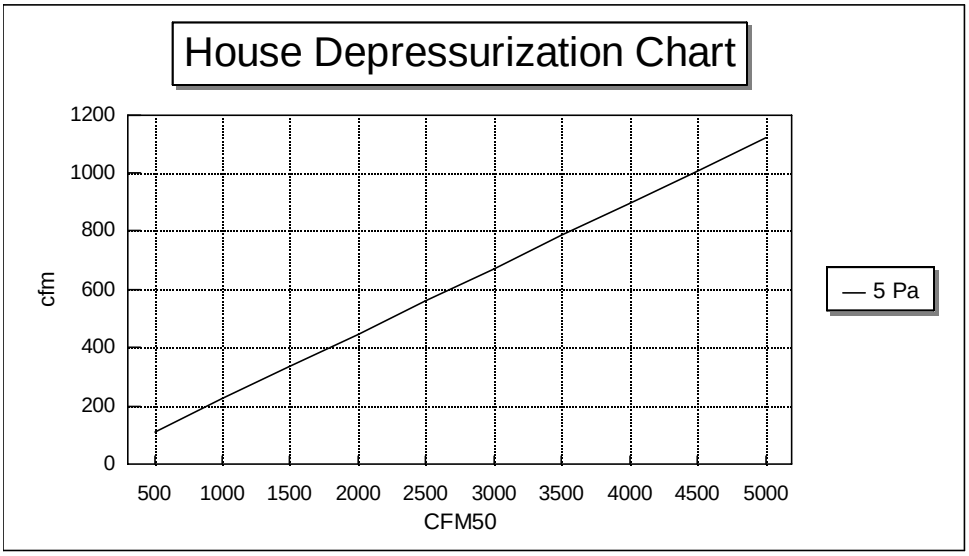
Estimated Exhaust Potential

Devices	Approximate Duct/Flue size (inches)	Typical Rated Flow CFM	Effective Flow CFM
Bathroom and rangehood fans	3 3 1/4 x 10 4 7 8	85 85 106 212 318	53 53 64 127 223
Exterior mounted kitchen fan	10 10	424 636	297 445
Clothes dryer	4	85-127	106
Central vacuum			117
Jenn-Aire or similar range or counter top/ext. vent	5 6 3 1/4 x 10	800 800 800	300 500 600
Wood burning fireplace			300
Open wood stove			65
Airtight wood stove			50
Atmospheric gas oil or propane appliances (water heaters, boilers, furnaces)	3 4 5 6		21 38 47 72

Sum of the effective flows for the building and locate this flow number on the Y-axis (left side-- cubic feet per minute) of Table 1506-10.3c.ii.

total effective flows
1506-10.3c.ii

Table 1506-10.3c.ii



Read across the chart to the intersection of the 5 Pascal pressure line.

read across chart
1506-10.3c.iii

Read down from this intersection to obtain the minimum CFM_{50} for the building.

read down chart
1506-10.3c.iv

Since this BTL is an estimate of exhaust potential and could overestimate the exhaust, there is some flexibility in this method. When this BTL is approached while air sealing, a worst case back draft test should be performed. If no problems exist, further air sealing is possible. The dwelling should never be tightened below the next highest BTL calculated.

caution
1506-10.3d