Chapter 12 – Venting of Appliances (Excerpts)

12.1* **Minimum Safe Performance**. Venting systems shall be designed and constructed to convey all flue and vent gases to the outdoors.

12.4.5.1 Venting systems shall not extend into or pass through any fabricated air duct or furnace plenum.

12.6.2.1* A chimney for residential-type appliances shall extend at least 3’ above the highest point where it passes through a roof of a building and at least 2’ higher than any portion of a building within a horizontal distance of 10’. (3/2/10 rule)

12.6.2.3 and 12.7.3 (2) Chimneys, Type B or Type L gas vents shall terminate at least 5 feet in vertical height above the highest connected appliance draft hood or flue collar.

12.6.5.1 An appliance shall not be connected to a chimney flue serving a separate appliance designed to burn solid fuel.

12.6.8.1 The remaining space surrounding a chimney liner, gas vent, or plastic piping installed within a masonry chimney shall not be used to vent another appliance.

12.7.3 **Gas Vent Termination** See figure 12.7.3 and Table 12.7.3 in the Code book for details.

12.7.4.2 **Vent Offsets** Gas vents sized outside of the provisions of Chapter 13 shall extend in a generally vertical direction with offsets not to exceed 45 degrees and the total horizontal distance of a vent plus the horizontal vent connector shall not be greater than 75% of the vertical height of the vent.

12.7.5.2* All appliances connected to the common vent in a multistory installation shall be located in rooms separated from occupiable space.

12.8.4.1* **Prohibited Use.** Single-wall metal pipe shall not be used as a vent in dwellings and residential occupancies.

12.8.4.4 Clearances to combustibles for single wall metal pipe are as listed in Table 12.8.4.4. Typically, gas – 6”, Type B – 1”, oil – 9”.

12.11.2.1 A vent connector shall not be made of noncombustible, corrosion-resistant material capable of withstanding the vent as temperature produced by the appliance and of sufficient thickness to withstand physical damage. Per 12.11.2.3, galvanized single wall shall be not less than 26 ga.

12.11.4.2 Where two or more vent connectors enter a common vent, chimney flue, or single-wall metal pipe, the smaller connector shall enter at the highest level consistent with the available headroom or clearance to combustible material.

12.11.6 **Joints**. Joints between sections of connector piping and connections to flue collars or draft hood outlets shall be fastened in accordance with one of the following methods.

(1) Sheet metal screws

(2) Vent connectors of listed vent material assembled and connected flue collars or draft hood outlets in accordance with the manufacturer’s instructions

12.11.7 **Slope.** A vent connector shall be installed without any dips or sags and shall slope upward toward the vent of chimney at least ¼ in./ft.

12.11.8* **Length of Vent Connector.**

12.11.8.1 The maximum horizontal length of a single-wall connector shall be 75 percent of the height of the chimney or vent, except for engineered systems.

12.11.8.2 The maximum horizontal length of a Type B double-wall connector shall be 100 percent of the height of the chimney or vent, except for engineered systems. The maximum length of an individual connector for a chimney or vent system serving multiple appliances, from the appliance outlet to the junction with the common vent or another connector, shall be 100 percent of the height of the chimney or vent.

12.11.9 **Support.** A vent connector shall be supported for the design and weight of the material employed to maintain clearances and prevent physical damage and separation of joints.

12.11.10 **Chimney Connections.** Where entering a flue in a masonry or metal chimney, the vent connector shall be installed above the extreme bottom to avoid stoppage. Where a thimble or slip joint is used to facilitate removal of the connector, the connector shall be firmly attached to or inserted into the thimble or slip joint to prevent the connector from falling out. Means shall be employed to prevent the connector from entering so far to restrict the space between its end and the opposite wall of the chimney flue.

12.11.11 **Inspection.** The entire length of a vent connector shall be readily accessible for inspection, cleaning, and replacement.

Chapter 13

13.1 Additional requirements to Single Appliance Venting

13.1.3 **Elbows.** Single-appliance venting configurations with zero (0) lateral lengths in Table 13.1 (a), Table 13.1 (b), and Table 13.1 (e) shall not have elbows in the venting system. Single appliance venting with lateral lengths include two 90-degrees elbows. For each additional elbow up to and including 45 degrees, the maximum capacity listed in the venting tables shall be reduced by 5 percent. For each additional elbow greater than 45 degrees up to and including 90 degrees, the maximum capacity listed in the venting tables shall be reduced by 10 percent. Where multiple offsets occur in a vent, the total lateral length of all offsets combined shall not exceed that specified in Table 13.1 (a) through Table 13.1 (e)

13.1.7* **Corrugated Chimney Liners.** Listed corrugated metallic chimney liner systems in masonry chimney shall be sized by using Table 13.1 (a) or Table 13.1 (b) for Type B vents, with the maximum capacity reduced by 20 percent (0.80 x maximum capacity) and the minimum capacity as shown in Table 13.1 (a) or Table 13.1(b). Corrugated metallic liner systems installed with bends or offsets shall have their maximum capacity further reduced in accordance with 13.1.3. The 20 percent reduction for corrugated metallic chimney liner systems includes an allowance for one long radius 90 degree turn at the bottom of the liner.

13.1.8 **Connections to Chimney Liners.** Connections between chimney liners and listed double-wall connectors shall be made with the listed adaptors designed for such purpose.

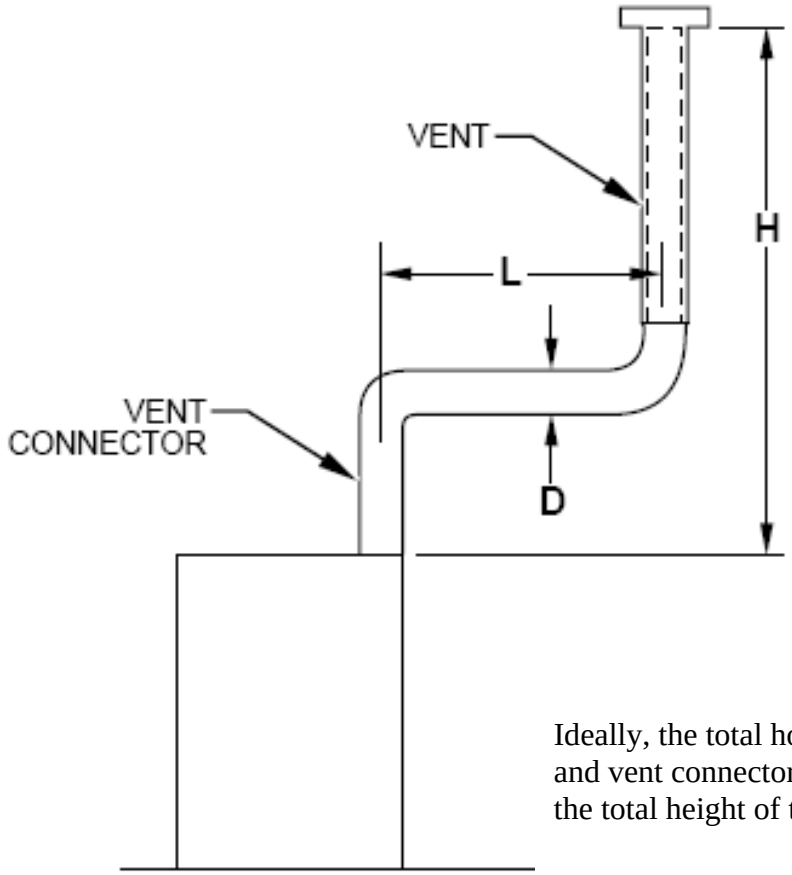
13.1.9 **Vertical Vent Upsizing/7 x Rule.** Where the vertical vent has a larger diameter than the vent connector, the vertical vent diameter shall be used to determine the minimum vent capacity, and the connector diameter shall be used to determine the maximum vent capacity. The flow area of the vertical vent shall not exceed seven times the flow area of the listed appliance categorized vent area, flue collar area, or draft hood outlet area unless designed in accordance with the approved engineering methods.

3.1.11 **Chimneys and Vent Locations**. Table 13.1(a) through Table 13.1(e) shall be used only for chimneys and vents not exposed to the outdoors below the roof line. A Type B vent or listed chimney lining system passing through an unused masonry chimney flue shall not be considered to be exposed to the outdoors. Vents exposed to the outdoors shall be enclosed… a Type B vent passing through an unventilated enclosure or chase insulated to a value of not less than R-8 shall not be considered to be exposed to the outdoors. This same rule applies to multiple appliance venting table usage.

13.1.13 **Upsizing** Vent connectors shall not be upsized more than two sizes greater than the listed appliance categorized vent damper, flue collar diameter, or draft hood outlet diameter.

13.1.15 and 13.1.16 **Interpolation and Extrapolation** Interpolation shall be allowed between table entries but extrapolation beyond table entries shall not be allowed.

Single Appliance Connected to a Type B Vent



Ideally, the total horizontal length of the vent and vent connector should not exceed 75% of the total height of the vent.

Appliance input: 70,000Btu/hr	**Type**: Nat □ Fan X
Connector:	**Vent**:
Lateral: 5 feet	H: 10 feet
Diameter and material: _____	Vent D: _____
Extra 90's: 1 extra	

Notes: _____

Chapter 13

13.2 Additional Requirements to Multiple Appliance venting

13.2.2 **Vent Connector Maximum Length.** The maximum vent connector horizontal length shall be 18 in./in. (18mm/mm) of connector diameter. See Table 13.2.2. (For example, a 4" vent connector can have a maximum length of 6' – 4 x 1.5)

13.2.3 **Vent Connector Exceeding Maximum Length**. For connectors exceeding the length specified in table 13.2.2, the maximum capacity of the connector shall be reduced by 10 for each multiple of the length listed.

13.2.4 **Vent Connector Manifolds**. Where the vent connectors are combined prior to entering the vertical portion of the common vent to form a common vent manifold, the size of the common vent manifold and the common vent shall be determined by applying a 10 percent reduction (0.90 x maximum common vent capacity) to the common vent capacity part of the common vent tables. The length of the common vent manifold shall not exceed 18 in/in. of common vent diameter.

13.2.5 **Vent Offsets**. Where the common vertical vent is offset, the maximum capacity of the common vent shall be reduced in accordance with 13.2.6 (Elbows in Vents) and the horizontal length of the common vent offset shall not exceed 18 in./in. of the common vent diameter.

13.2.6 **Elbows in Vents**. For each elbow up to and including 45 degrees in the common vent, the maximum common vent capacity listed in the venting tables shall be reduced by 5 percent. For each elbow greater than 45 degrees up to and including 90 degrees, the maximum common vent capacity listed in the venting tables shall be reduced by 10 percent.

13.2.7 **Elbows in Connectors.** The vent connector capacities listed in the common vent sizing tables include allowance for two 90-degree elbows. For each additional elbow up to and including 45 degrees, the maximum vent connector capacity listed in the venting tables shall be reduced by 5 percent. For each elbow greater than 45 degrees up to and including 90 degrees, the maximum vent connector capacity listed in the venting tables shall be reduced by 10 percent.

13.2.8 **Common Vent Minimum Size.** The cross-sectional area of the common vent shall be equal to or greater than the cross-sectional area of the largest connector.

13.2.9 **Tee and Wye Fittings.** Tee and wye fittings connected to a common gas vent shall be considered as part of the common gas vent and constructed of materials consistent with that of the common gas vent.

13.2.18 **Vertical Vent Size Limitation**. Where two or more appliances are connected to a vertical vent or chimney, the flow are of the largest section of vertical vent or chimney shall not exceed seven times the smallest appliance outlet.

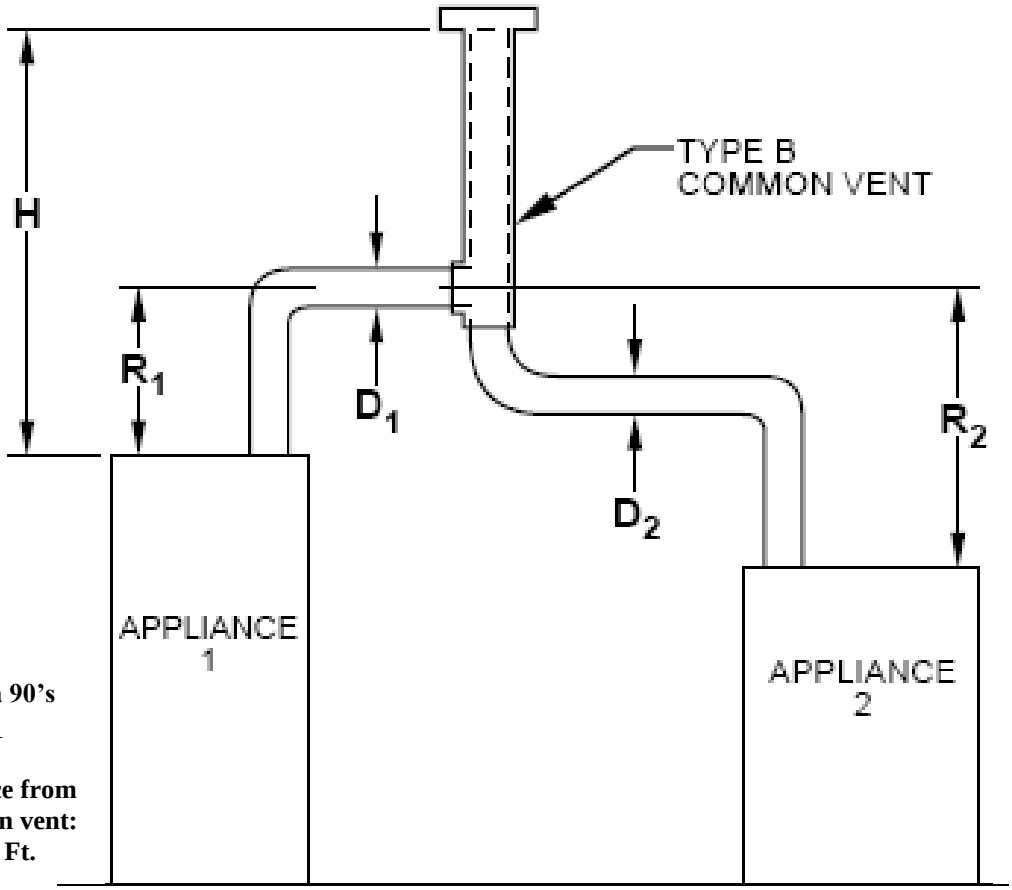
13.2.20 **Corrugated Chimney Liners.** Listed corrugated metallic chimney liner systems in masonry chimneys shall be sized by using Table 13.2(a) or Table 13.2(b) for Type B vents, with the maximum capacity reduced by 20 percent (0.80 x maximum capacity) and the minimum capacity as shown in the Table 13.2 (a) or Table 13.2 (b). Corrugated metallic liner systems installed with bends or offsets shall

have their maximum capacity further reduced in accordance with 13.2.5 and 13.2.6. The 20 percent reduction for corrugated metallic chimney liner systems includes an allowance for one long radius 90-degree turn at the bottom of the liner.

13.2.21 **Connections to Chimney Liners.** Where double-wall connectors are required, tee and wye fittings used to connect to the common vent chimney liner shall be listed double-wall fittings. Connections between chimney liners and listed double wall fittings shall be made with listed adapter fittings designed for such purpose.

13.2.27 and 13.2.28 **Interpolation and Extrapolation**. Interpolation shall be allowed between table entries but extrapolation beyond table entries shall not be allowed.

Multiple Appliances Connected to a Type B Vent



Extra 90's
1

Distance from common vent:
3.5 Ft.

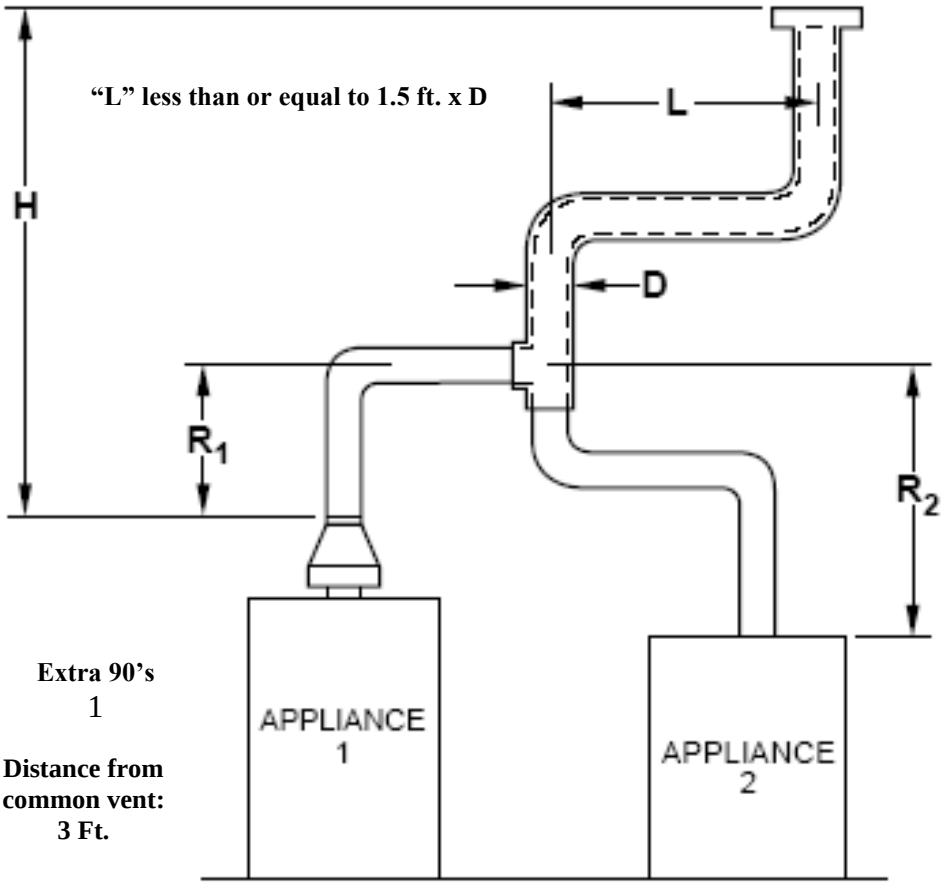
Extra 90's
0

Distance from common vent:
6.5 Ft.

Appliance 1 input: 32,000 Btu/hr		**Type**: Nat X Fan □
Appliance 2 input: 66,000 Btu/hr		**Type**: Nat □ Fan X
Connectors:	R1: 1 foot	D1/Material: _____
	R2: 2 feet	D2/Material: _____
Common vent:	H: 10 feet	Vent D: _____

Notes: _____

Multiple Appliances Connected to an Offset Type B Vent



Extra 90's
1

Distance from common vent:
3 Ft.

Extra 90's
2

Distance from common vent:
4 Ft.

Appliance 1 input: 38,000 Btu/hr		**Type**: Nat X Fan □
Appliance 2 input: 75,000 Btu/hr		**Type**: Nat □ Fan X
Connectors:	R1: 1foot	D1/Material: _____
	R2: 3 feet	D2/Material: _____
Common vent:	H: 15 feet	Vent D: _____

Notes: _____

_____

_____

_____

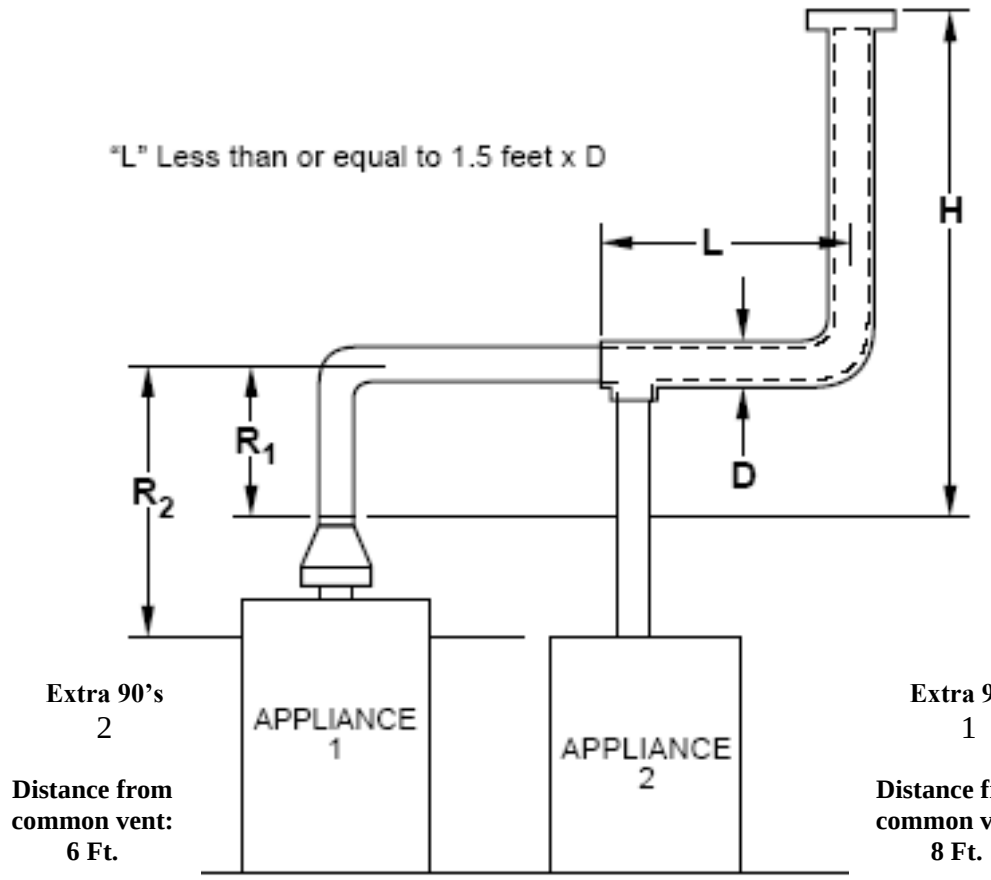
_____

_____

_____

_____

Multiple Appliances Connected to a Manifold Type B Vent



Appliance 1 input: 110,000 Btu/hr		**Type**: Nat X Fan □
Appliance 2 input: 34,000 Btu/hr		**Type**: Nat X Fan □
Connectors:	R1: 2 feet	D1/Material: _____
	R2: 1 foot	D2/Material: _____
Common vent:	H: 25 feet	Vent D/Material: _____ (for both Type B and a flexible liner)

Notes: _____

General Venting Rules

"Better than code"

6/1/20

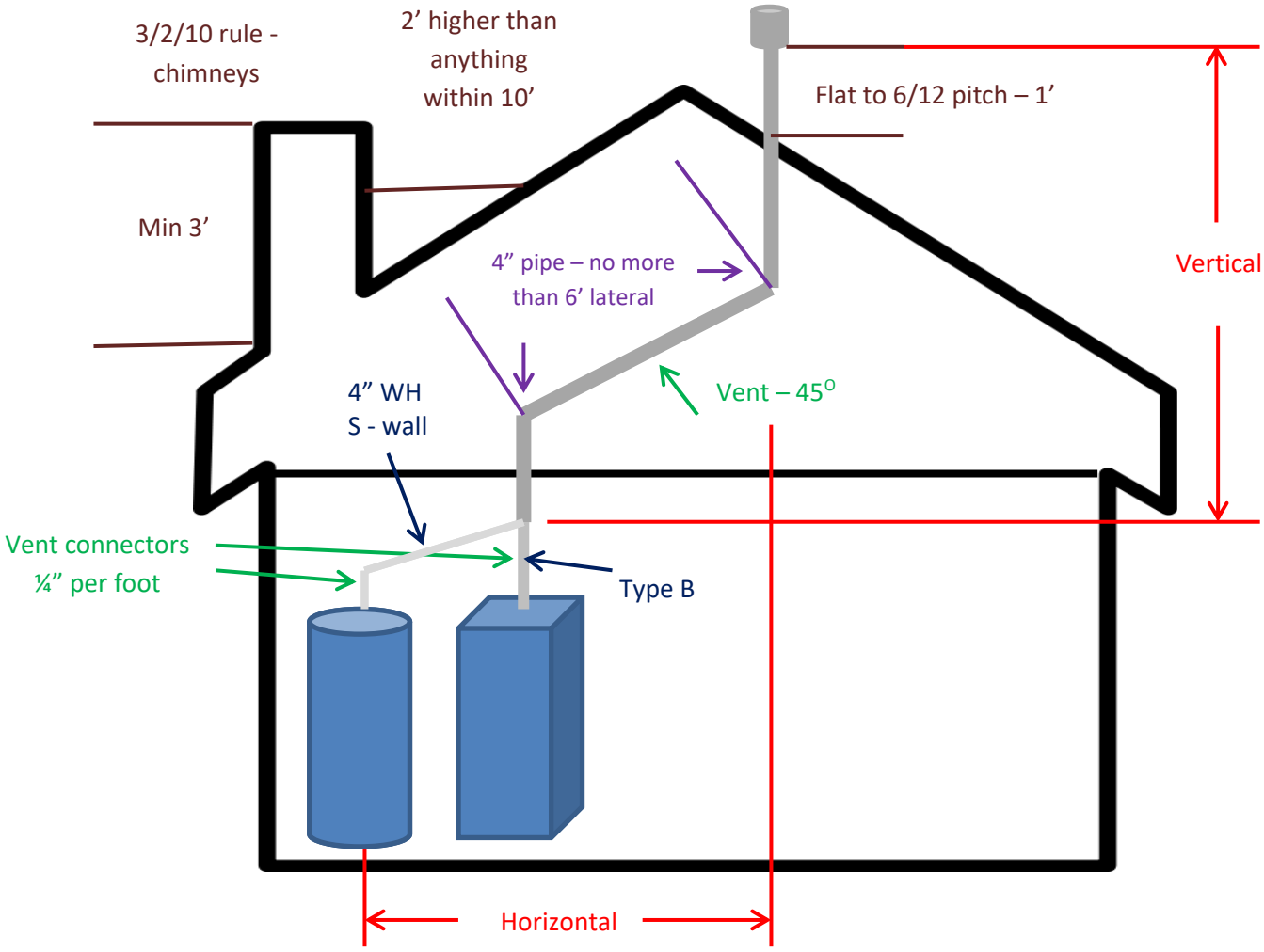
75% Rule: The total horizontal length of the vent and vent connectors should not exceed 75% of the height of the vent system. Single appliance – from the connection point to the cap. Multiple appliances – from the wye to the cap.

Slope: Vent connectors – ¼ inch per foot / Vent – should not be less than 45^{O}

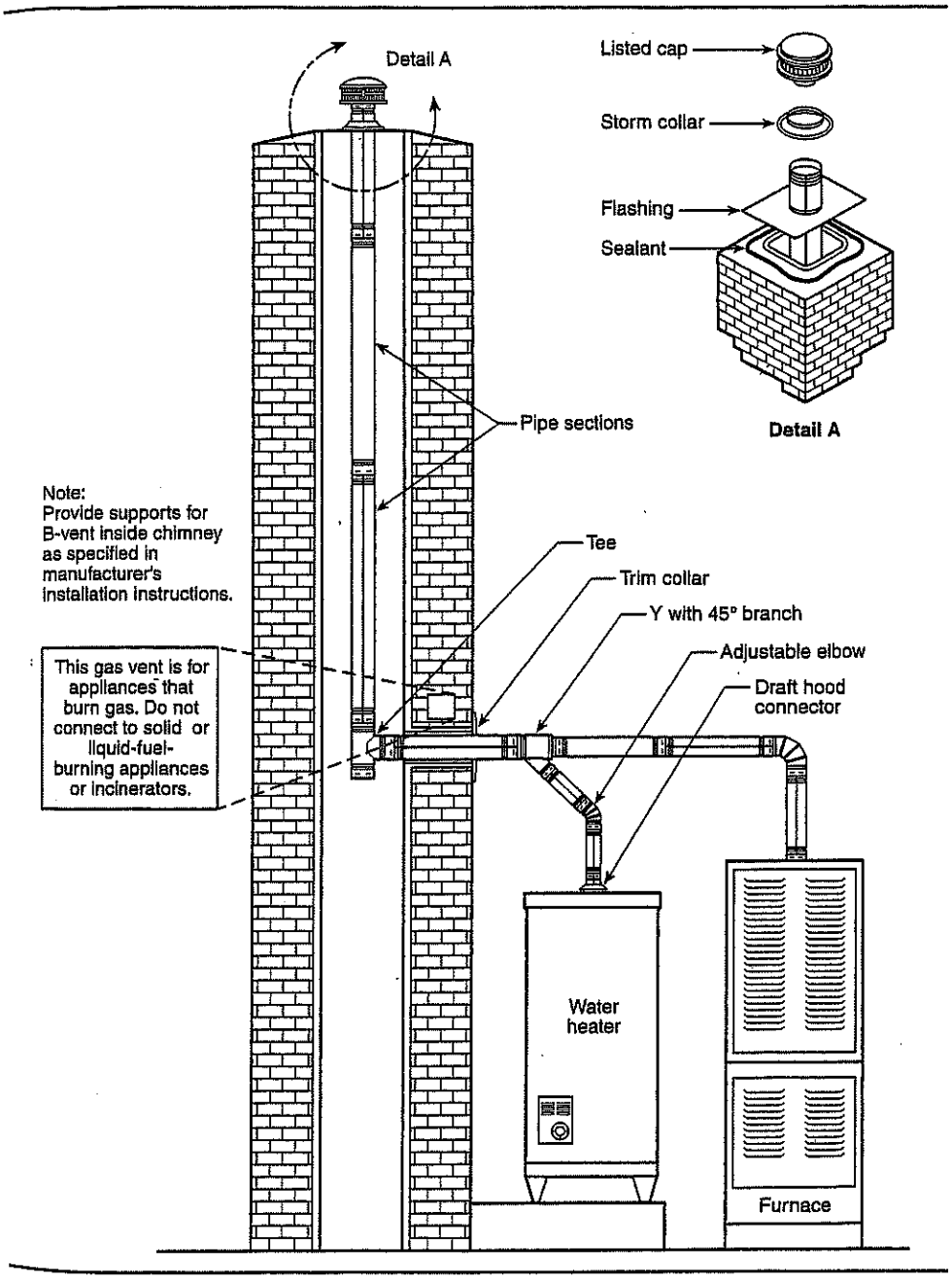
Vent offset: No more than 18" per inch of vent diameter (1 ½ feet per inch)

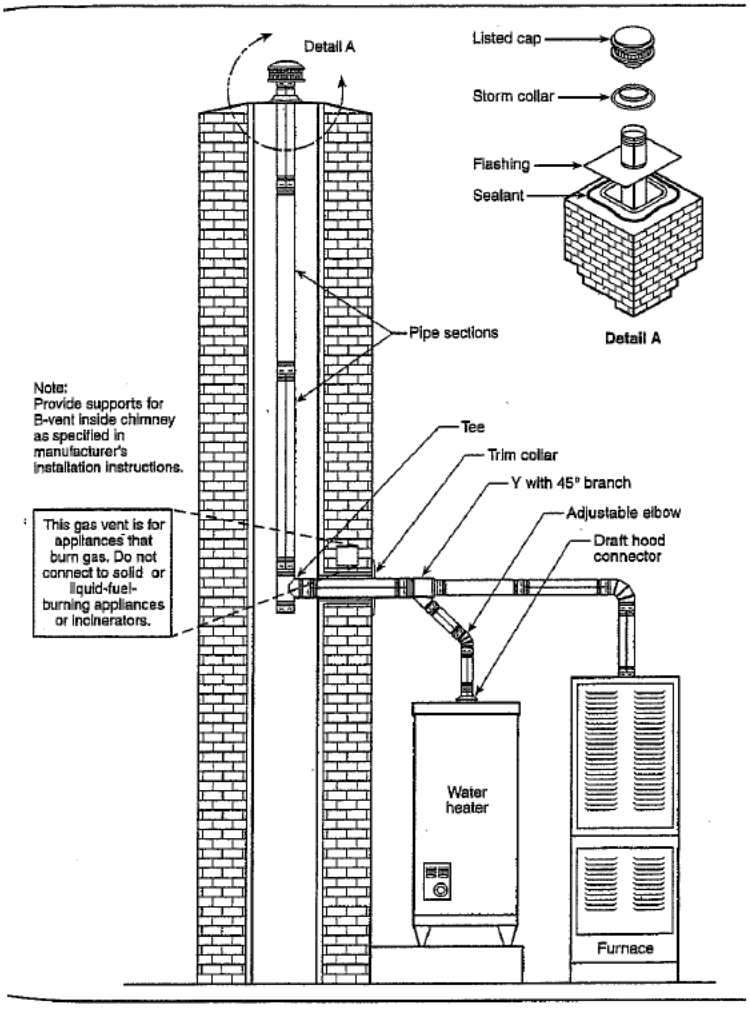
Materials: 4" for the water heater (can be single wall) – Type B for the furnace (80% unit)

Termination: Follow the table in the Code book (Flat to 6/12 pitch – 1') (3/2/10 rule - chimneys)



Venting – B-Vent in Masonry Chimney




Detail A
Listed cap
Storm collar
Flashing
Sealant
Detail A
Pipe sections
Note:
Provide supports for B-vent inside chimney as specified in manufacturer's installation instructions.
This gas vent is for appliances that burn gas. Do not connect to solid or liquid-fuel-burning appliances or incinerators.
Tee
Trim collar
Y with 45° branch
Adjustable elbow
Draft hood connector
Water heater
Furnace

"Quick" rules for Combustion and Ventilation Air calculations
Based on NFPA 54 2012 Edition

Standard method using volume:

- 50 cu.ft. of volume/1000 Btuh – ($1/20^{th}$ rule)
- Must have greater than .4 ACH

Air from inside:

- Combining spaces on the same story
  - 1 sq.in. of net free area/1000 Btuh – minimum 100 square inches
  - Two openings- one within 12" of the top and one within 12" of the bottom of the enclosure
- Combining spaces on different stories
  - 2 sq.in. of net free area/1000 Btuh

Air from outside:

- Two openings- one within 12" of the top and one within 12" of the bottom of the enclosure
  - Vertical – 1 sq.in. of net free area/4000 Btuh
  - Horizontal – 1 sq.in of net free area/2000 Btuh
- One opening:
  - 1 sq.in. of net free area/3000 Btuh

Combination of indoor and outdoor air:

- Available volume/required volume to obtain ratio
- Subtract ratio from 1 to obtain reduction factor
- Calculate full outdoor opening requirement and multiply by reduction factor

Known air infiltration rate method: (KAIR)

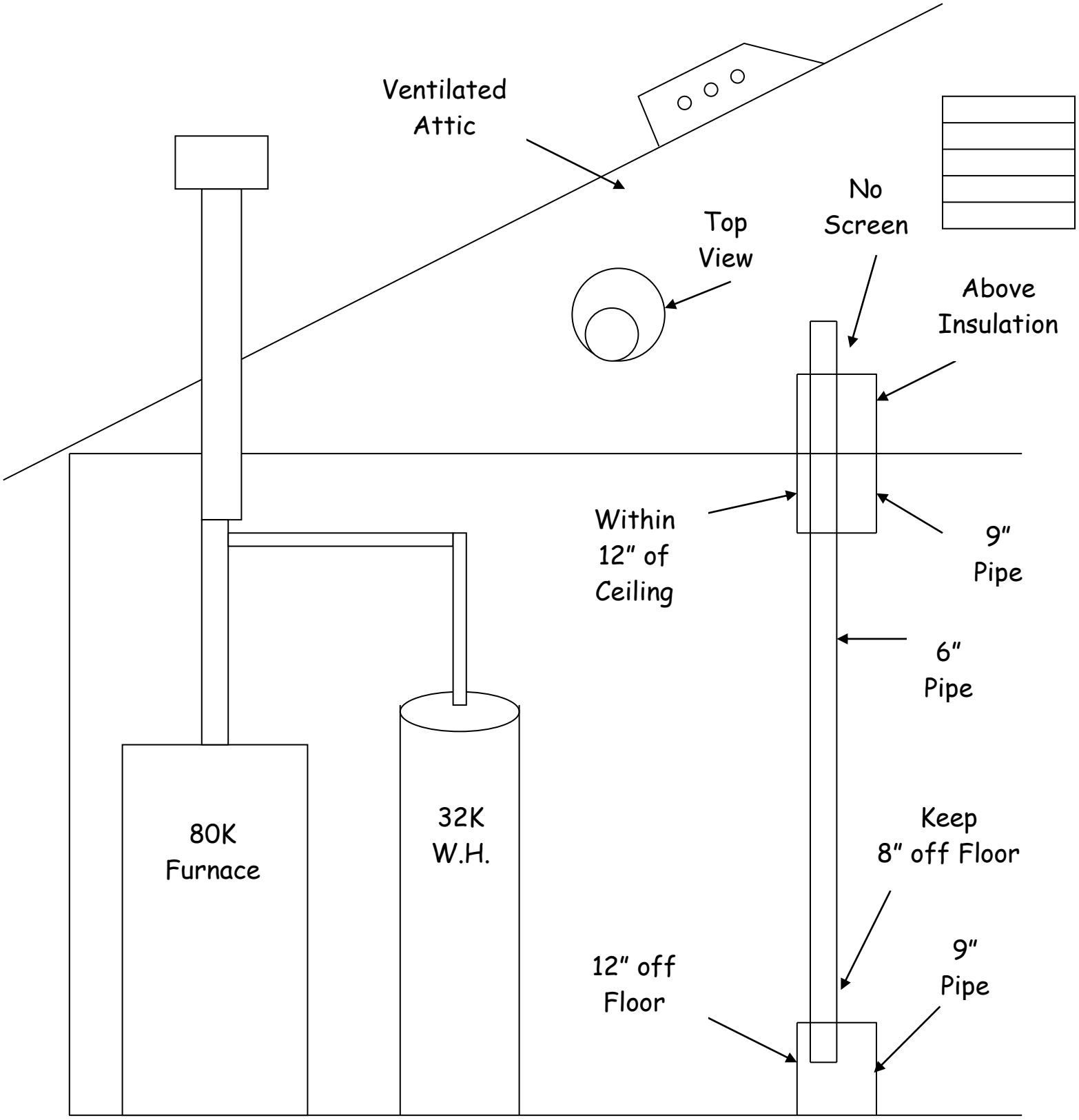
- Required volume for draft hood equipped appliances must be greater than:
  - ($21ft.^3$/ACH) x (Input/1000Btuh)
- Required volume for fan assisted appliances must be greater than:
  - ($15ft.^3$/ACH) x (Input/1000Btuh)
- For infiltration rates less than .6 ACH

Pipe Sizes and Maximum Equivalent Btu Capacities for Combustion Air Openings

Pipe Size (Diameter)	Area (sq. in.)	Vertical 4000 Btu/Sq.In.	Horizontal 2000 Btu/Sq.In.	Single Opening 3000 Btu/Sq.In.
3"	7.1	28,400	14,200	21,300
4"	12.6	50,400	25,200	37,800
5"	19.6	78,400	39,200	58,800
6"	28.3	113,200	56,600	84,900
7"	38.5	154,000	77,000	115,000
8"	50.3	201,200	100,600	150,900
9"	63.6	254,400	127,200	190,800
10"	78.5	314,000	157,000	235,500

Passive Combustion and Ventilation Air Configuration

Based NFPA-54 2018 Section 9.3.3.1 – Vertical pipes with a minimum free area opening of 1 in.^{2} / 4000 Btu/hr total input of the appliances in the space



lightning protection grounding system. Where galvanic corrosion is of concern, the bond may be made via a spark gap or gas discharge tube.

A.8.1.1 Because it is sometimes necessary to divide a piping system into test sections and install test heads, connecting piping, and other necessary appurtenances for testing, it is not required that the tie-in sections of pipe be pressure-tested. Tie-in connections, however, should be tested with a noncorrosive leak detection fluid after gas has been introduced and the pressure has been increased sufficiently to give some indications whether leaks exist.

The test procedure used should be capable of disclosing all leaks in the section being tested and should be selected after giving due consideration to the volumetric content of the section and to its location.

Under no circumstances should a valve in a line be used as a bulkhead between gas in one section of the piping system and test medium in an adjacent section, unless two valves are installed in series with a valved "telltale" located between these valves. A valve should not be subjected to the test pressure unless it can be determined that the valve, including the valve closing mechanism, is designed to safely withstand the test pressure.

A.8.1.4.3 During pressure tests conducted over long periods of time, such as overnight, the effects of temperature on pressure should be considered. Temperature drops can cause a drop in pressure great enough to be indicated by the test gauge. These temperature drops may cause test evaluators to think that a leak exists in the piping system when in fact the pressure drop was caused by a decrease in the ambient temperature. See Example 5 in C.8.5.

A.8.2.3 See Annex D for a suggested method.

A.8.3 The process of purging a gas pipeline of fuel gas and replacing the fuel gas with air or charging a gas pipeline that is full of air with fuel gas requires that a significant amount of combustible mixture not be developed within the pipeline or released within a confined space.

A.9.1.1 The American Gas Association, American National Standards Institute, Inc., and the National Fire Protection Association do not approve, inspect, or certify any installations, procedures, appliances, equipment, or materials; nor do they approve or evaluate testing laboratories. In determining acceptability of installations, procedures, appliances, equipment, or materials, the authority having jurisdiction can base acceptance on compliance with AGA, ANSI, CSA, or NFPA, or other appropriate standards. In the absence of such standards, said authority can require evidence of proper installation, procedure, or use. The authority having jurisdiction can also refer to the listings or labeling practices *(see 3.2.3, Labeled, and 3.2.4, Listed)* of an organization concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items. Additional information regarding the coordination of appliance design, construction, and maintenance can be found in Annex B.

A.9.1.6 Halogenated hydrocarbons are particularly injurious and corrosive after contact with flames or hot surfaces.

A.9.3 Operation of exhaust fans, ventilation systems, clothes dryers, or fireplaces can create conditions requiring special attention to avoid unsatisfactory operation of installed appliances.

A.9.3.2.1 See Table A.9.3.2.1.

A.9.3.2.2 See Table A.9.3.2.2(a) and Table A.9.3.2.2(b).

Table A.9.3.2.1 Standard Method: Required Volume, All Appliances

Appliance Input (Btu/hr)	Required Volume (ft^3)
5,000	250
10,000	500
15,000	750
20,000	1,000
25,000	1,250
30,000	1,500
35,000	1,750
40,000	2,000
45,000	2,250
50,000	2,500
55,000	2,750
60,000	3,000
65,000	3,250
70,000	3,500
75,000	3,750
80,000	4,000
85,000	4,250
90,000	4,500
95,000	4,750
100,000	5,000
105,000	5,250
110,000	5,500
115,000	5,750
120,000	6,000
125,000	6,250
130,000	6,500
135,000	6,750
140,000	7,000
145,000	7,250
150,000	7,500
160,000	8,000
170,000	8,500
180,000	9,000
190,000	9,500
200,000	10,000
210,000	10,500
220,000	11,000
230,000	11,500
240,000	12,000
250,000	12,500
260,000	13,000
270,000	13,500
280,000	14,000
290,000	14,500
300,000	15,000

For SI units, 1 ft^3 = 0.028 m^3, 1000 Btu/hr = 0.293 kW.

A.9.3.2.3(1) See Figure A.9.3.2.3(1).

A.9.3.3.1(1) See Figure A.9.3.3.1(1)(a) and Figure A.9.3.3.1(1)(b).

A.9.3.3.1(2) See Figure A.9.3.3.1(2).

A.9.3.3.2 See Figure A.9.3.3.2.

Table A.9.3.2.2(a) Known Air Infiltration Rate Method: Minimum Space Volume for Appliances Other than Fan-Assisted for Specified Infiltration Rates (ACH)

Appliance Input (Btu/hr)	Space Volume (ft^3)		
	0.25 *ACH*	0.30 *ACH*	0.35 *ACH*
5,000	420	350	300
10,000	840	700	600
15,000	1,260	1,050	900
20,000	1,680	1,400	1,200
25,000	2,100	1,750	1,500
30,000	2,520	2,100	1,800
35,000	2,940	2,450	2,100
40,000	3,360	2,800	2,400
45,000	3,780	3,150	2,700
50,000	4,200	3,500	3,000
55,000	4,620	3,850	3,300
60,000	5,040	4,200	3,600
65,000	5,460	4,550	3,900
70,000	5,880	4,900	4,200
75,000	6,300	5,250	4,500
80,000	6,720	5,600	4,800
85,000	7,140	5,950	5,100
90,000	7,560	6,300	5,400
95,000	7,980	6,650	5,700
100,000	8,400	7,000	6,000
105,000	8,820	7,350	6,300
110,000	9,240	7,700	6,600
115,000	9,660	8,050	6,900
120,000	10,080	8,400	7,200
125,000	10,500	8,750	7,500
130,000	10,920	9,100	7,800
135,000	11,340	9,450	8,100
140,000	11,760	9,800	8,400
145,000	12,180	10,150	8,700
150,000	12,600	10,500	9,000
160,000	13,440	11,200	9,600
170,000	14,280	11,900	10,200
180,000	15,120	12,600	10,800
190,000	15,960	13,300	11,400
200,000	16,800	14,000	12,000
210,000	17,640	14,700	12,600
220,000	18,480	15,400	13,200
230,000	19,320	16,100	13,800
240,000	20,160	16,800	14,400
250,000	21,000	17,500	15,000
260,000	21,840	18,200	15,600
270,000	22,680	18,900	16,200
280,000	23,520	19,600	16,800
290,000	24,360	20,300	17,400
300,000	25,200	21,000	18,000

For SI units, 1 ft^3 = 0.028 m^3, 1000 Btu/hr = 0.293 kW.
ACH: Air change per hour.

Table A.9.3.2.2(b) Known Air Infiltration Rate Method: Minimum Space Volume for Fan-Assisted Appliance, for Specified Infiltration Rates (ACH)

Appliance Input (Btu/hr)	Required Volume (ft^3)		
	0.25 *ACH*	0.30 *ACH*	0.35 *ACH*
5,000	300	250	214
10,000	600	500	429
15,000	900	750	643
20,000	1,200	1,000	857
25,000	1,500	1,250	1,071
30,000	1,800	1,500	1,286
35,000	2,100	1,750	1,500
40,000	2,400	2,000	1,714
45,000	2,700	2,250	1,929
50,000	3,000	2,500	2,143
55,000	3,300	2,750	2,357
60,000	3,600	3,000	2,571
65,000	3,900	3,250	2,786
70,000	4,200	3,500	3,000
75,000	4,500	3,750	3,214
80,000	4,800	4,000	3,429
85,000	5,100	4,250	3,643
90,000	5,400	4,500	3,857
95,000	5,700	4,750	4,071
100,000	6,000	5,000	4,286
105,000	6,300	5,250	4,500
110,000	6,600	5,500	4,714
115,000	6,900	5,750	4,929
120,000	7,200	6,000	5,143
125,000	7,500	6,250	5,357
130,000	7,800	6,500	5,571
135,000	8,100	6,750	5,786
140,000	8,400	7,000	6,000
145,000	8,700	7,250	6,214
150,000	9,000	7,500	6,429
160,000	9,600	8,000	6,857
170,000	10,200	8,500	7,286
180,000	10,800	9,000	7,714
190,000	11,400	9,500	8,143
200,000	12,000	10,000	8,571
210,000	12,600	10,500	9,000
220,000	13,200	11,000	9,429
230,000	13,800	11,500	9,857
240,000	14,400	12,000	10,286
250,000	15,000	12,500	10,714
260,000	15,600	13,000	11,143
270,000	16,200	13,500	11,571
280,000	16,800	14,000	12,000
290,000	17,400	14,500	12,429
300,000	18,000	15,000	12,857

For SI units, 1 ft^3 = 0.028 m^3, 1000 Btu/hr = 0.293 kW.
ACH: Air change per hour.

Vent System Inspection

Vent type: ☐ Masonry chimney ☐ Liner ☐ Type B ☐ Factory ☐ PVC / plastic
Does the vent have the proper materials and configuration? (connector materials, gauge, slope, condition, support, cap…etc) ☐ Yes ☐ No
Notes:

SWS 5.0109.4a, 5.0504.1, 5.0503.1 BPI 1200 7.8.1

_____

_____

_____

_____

Electrical Safety

Is the polarity to furnace correct? ☐ Yes ☐ No
Is there a shut-off switch within reach of the furnace? ☐ Yes ☐ No
Does the wiring appear to be in good condition with proper connectors? ☐ Yes ☐ No
Notes: _____

SWS 5.0109.4a, 2.0301.1, 5.0203.1f

_____

_____

_____

Combustion Air

Total Btuh of equipment in the CAZ using interior air for combustion: _____ Btuh
Volume of combustion air needed (standard method – Btuh divided by 20): _____ Cu.ft.
Volume of combustion air available (communicates directly with the CAZ): _____ Cu.ft.
Determine if or how combustion air needs will be met.
Notes: _____

SWS 5.0502.1

_____

_____

_____

Thermostat

Is the thermostat location functional? ☐ Yes ☐ No
Has the hole been sealed behind the thermostat? ☐ Yes ☐ No
Notes: _____

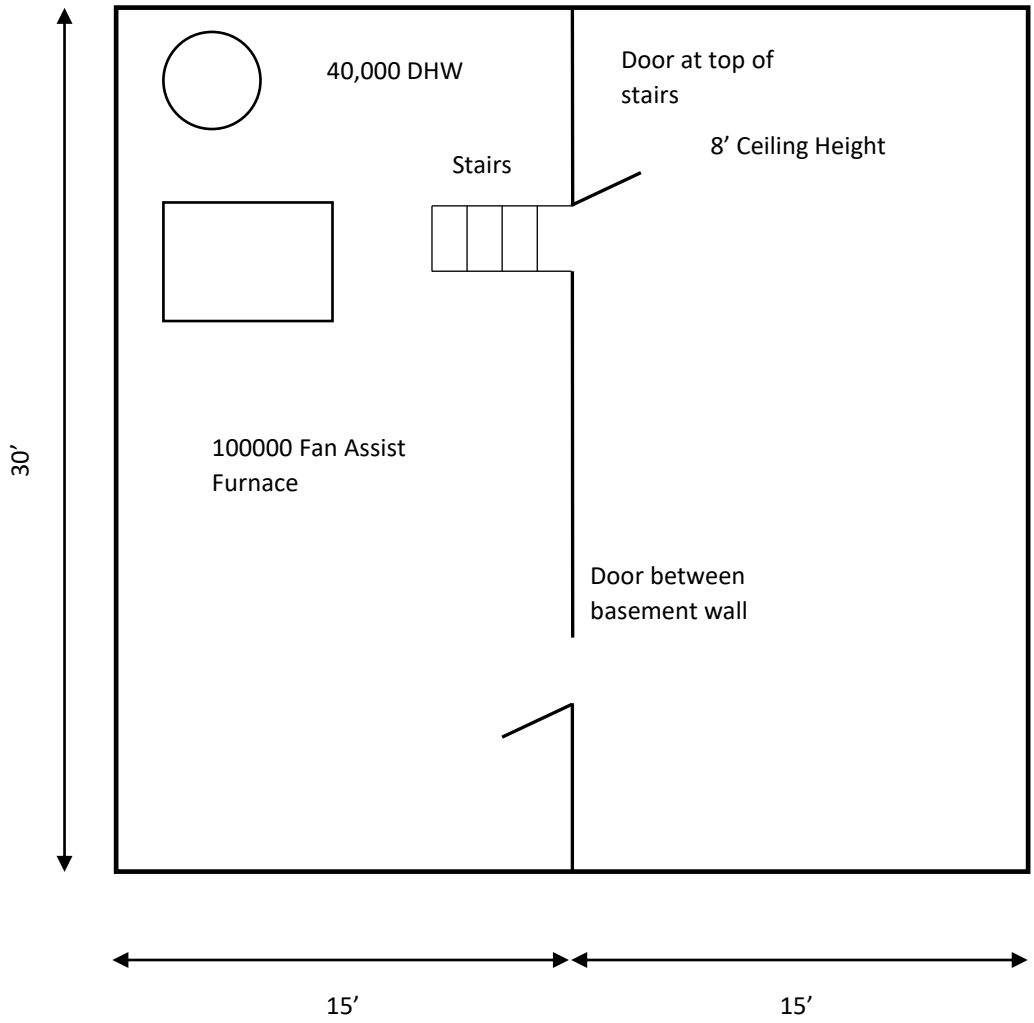
SWS 5.0101.1, 5.0109.4a

_____

_____

_____

Combustion Air Worksheet



Combustion Air Worksheet

- C.A.Z. Volume _____
- Required Volume based on total Btu _____
- Resolution based on N.F.P.A. 54 approved methods _____
- Show all calculations and a sketch with details.

Calculation Worksheet: Sizing Combustion Air Openings

Step 1:

- Enter input ratings of all appliances
- Total the column

Appliance	Input Rating (Btu/hr)
Furnace	
Water Heater	
Range	
Space Heater	
Total	

Step 2:

- Determine if the Combustion Appliance Zone needs more combustion air

Total Btu _____ / 1,000 = _____ x 50 cu. Ft. = _____ Required Volume

---

Step 3:

- If equal to or more than required volume, no change is needed
- If less than required volume proceed with approved resolution

---

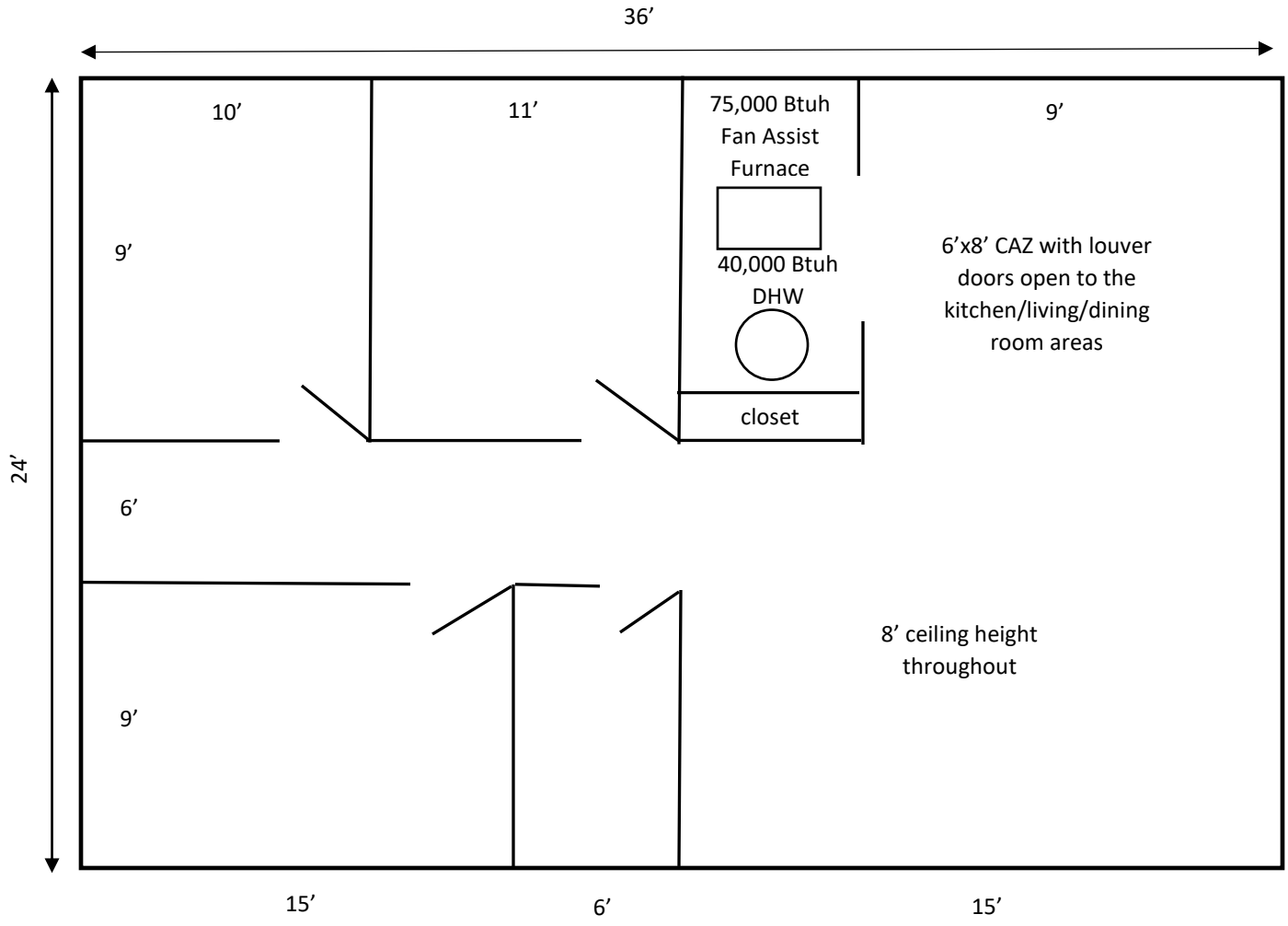
9.3.2.3. (1) Combining spaces on the same story

- Each opening shall have 1 sq. in. per 1,000 Btu of total Btu in C.A.Z.
- Total Btu _____ / 1,000 = _____ x 1 sq. in. = _____sq. in. per opening
- One opening within 12" of ceiling
- One opening within 12" of floor
- Grille reduction % _____ x Actual grille size _____ sq. in. = Net free area _____ sq. in.

9.3.2.3 (2) Combining spaces on different stories

- Total Btu _____ / 1,000 = _____ x 2 sq. in. = _____ sq. in. total
- Grille reduction % _____ x Actual grille size _____ sq. in. = Net free area _____ sq. in.
- One or more openings in doors or floors

Combustion Air Worksheet



Combustion Air Worksheet

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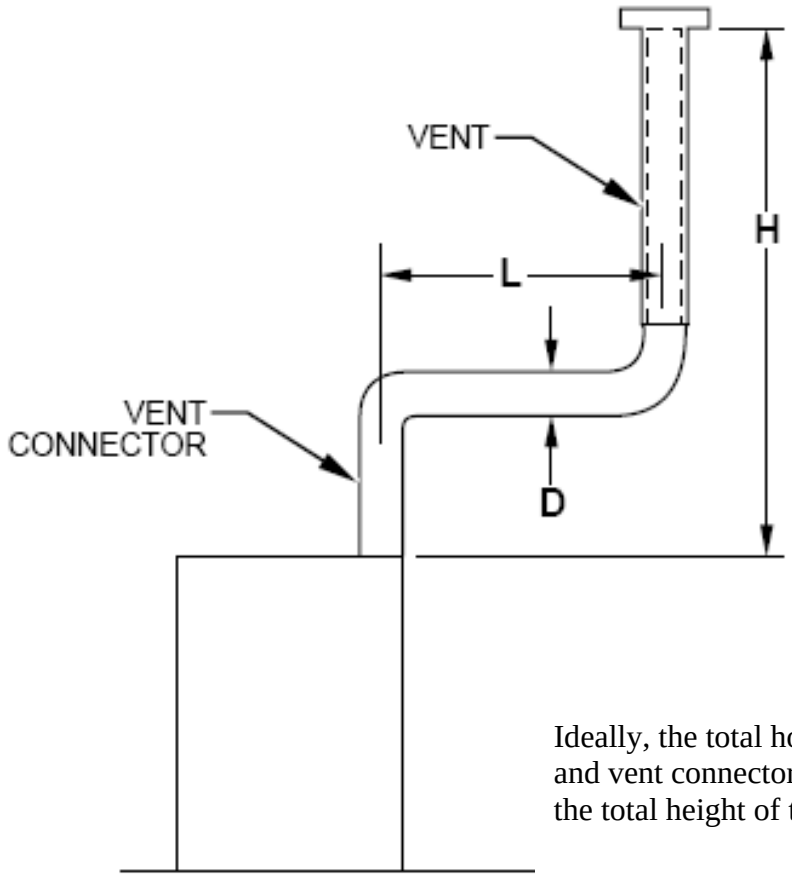
9.3.2.3 (2) Combining spaces on different stories

- Total Btu _____ / 1,000 = _____ x 2 sq. in. = _____ sq. in. total
- Grille reduction % _____ x Actual grille size _____ sq. in. = Net free area _____ sq. in.
- One or more openings in doors or floors

Venting Test 1

Single Appliance Connected to a Type B Vent



Ideally, the total horizontal length of the vent and vent connector should not exceed 75% of the total height of the vent.

Appliance input: 80,000Btu/hr	**Type**: Nat □ Fan X
Connector:	**Vent**:
Lateral: 7.5 feet	H: 20 feet
Diameter and material: _____	Vent D: _____
Extra 90's: 1 extra	

Notes: _____

_____

_____

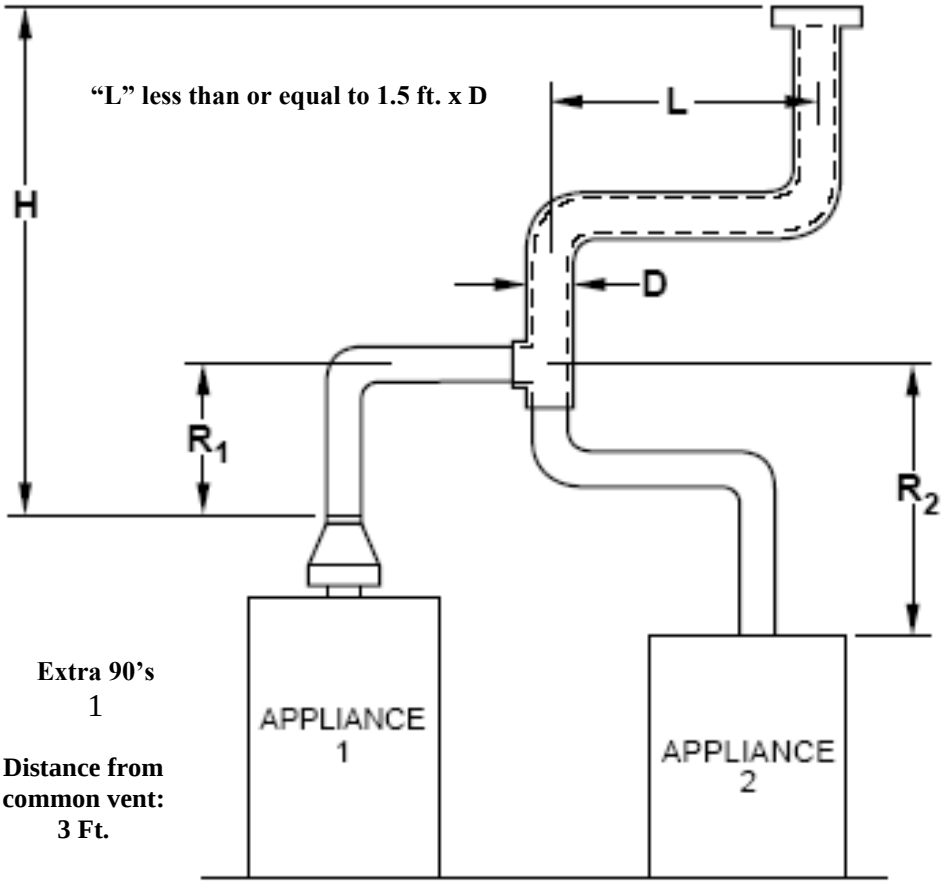
_____

_____

_____

Venting Test 2

Multiple Appliances Connected to an Offset Type B Vent



Extra 90's
1

Distance from common vent: 3 Ft.

Extra 90's
2

Distance from common vent: 4 Ft.

Appliance 1 input: 36,000 Btu/hr		**Type**: Nat X Fan □
Appliance 2 input: 80,000 Btu/hr		**Type**: Nat □ Fan X
Connectors:	R1: 2foot	D1/Material: _____
	R2: 3 feet	D2/Material: _____
Common vent:	H: 20 feet	Vent D: _____

Notes: _____

_____

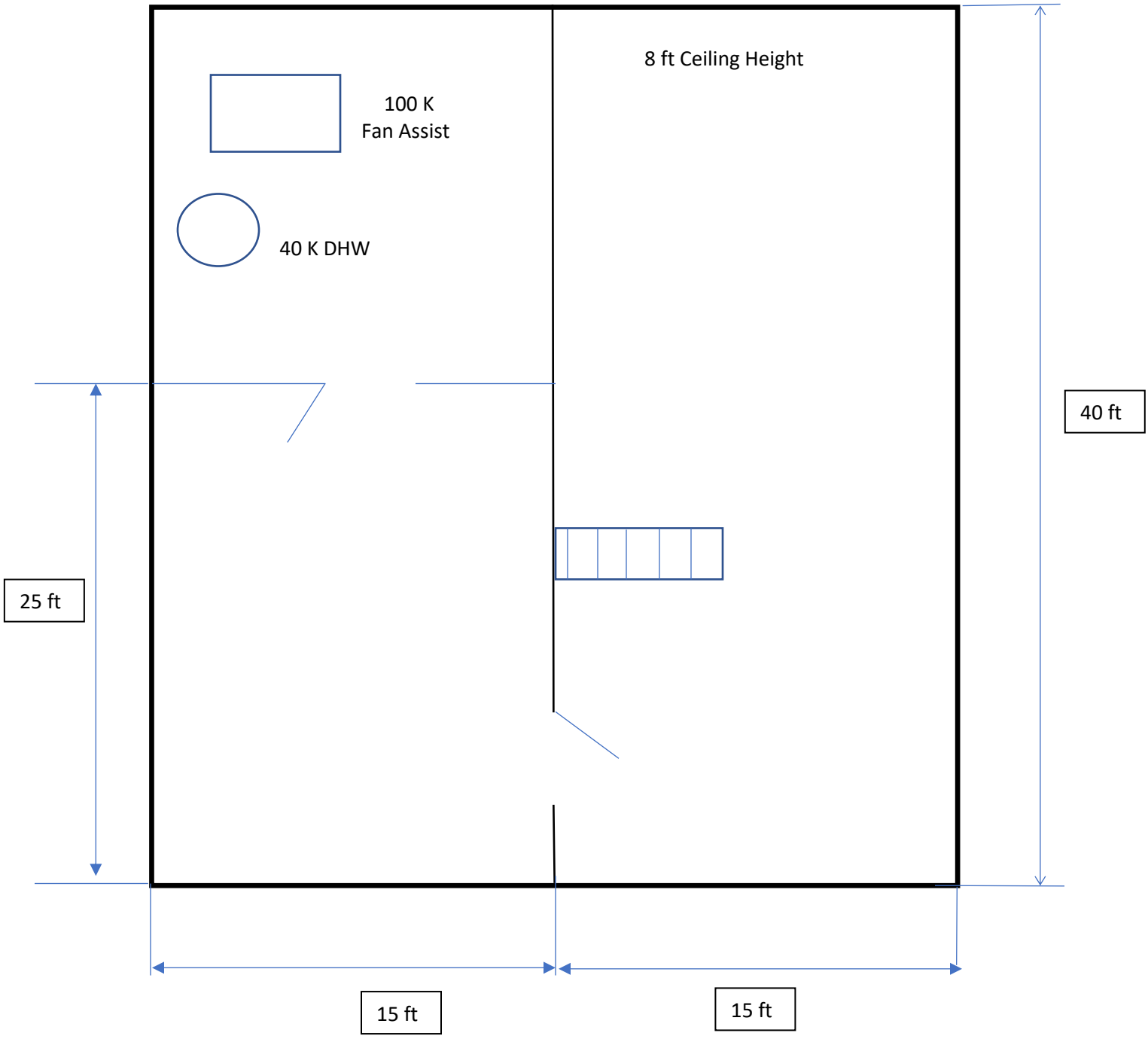
_____

_____

_____

_____

Combustion Air Test 1



Combustion Air Test 1

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Combustion Air Worksheet

- C.A.Z. Volume _____
- Required Volume based on total Btu _____
- Resolution based on N.F.P.A. 54 approved methods _____
- Show all calculations and a sketch with details.

Calculation Worksheet: Sizing Combustion Air Openings

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Water Heater	
Range	
Space Heater	
Total	

Step 2:

- Determine if the Combustion Appliance Zone needs more combustion air

Total Btu _____ / 1,000 = _____ x 50 cu. Ft. = _____ Required Volume

---

Step 3:

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