



State of Ohio
Weatherization Program
Standards

Section	DIAGNOSTIC TESTING METHODS
Subject	Specifically Engineered Systems

SPECIFICALLY-ENGINEERED SYSTEMS 1506-11

Use the following procedure for adding a measured amount of supply air to a basement to provide adequate combustion air. The input rating of sealed combustion appliances is not added to the total input rating for the purposes of this calculation.

adding combustion air
1506-11.1a

Add the combined Btu/hr input of the combustion appliances located in the basement (CAZ) and determine the make-up air requirements.

required volume for CAZ
1506-11.1b

Furnace Btu/hr input + domestic hot water Btu/hr input = Total Btu/hr input

Total Btu/hr input / 1,000 x 50 cubic feet = Required volume for CAZ

Determine the actual CAZ volume. Length x width x height = Cubic feet volume

CAZ volume
1506-11.1c

Determine the amount of combustion input that requires make-up air in excess of that provided by the existing CAZ volume.

determine needed combustion air
1506-11.1d

Required CAZ volume – Actual CAZ volume / 50 Btu/hr per 1,000 cubic feet = Btu/hr of combustion that requires make-up air.

Use a pitot tube to measure the static pressure at the mid-point of a main supply branch duct or trunk where an additional supply branch and register can be installed. If there is a supply branch with a register already existing, assure that it has an un-dampened register installed and that it has adequate airflow to meet the combustion make-up air requirements.

measure static pressure
1506-11.1e

Plenum or trunk mounted registers shall not be installed or used for this purpose. In most cases it is preferable to close or seal up these registers and provide branch mounted registers to meet the heating and combustion air requirements of the basement.

duct sizing
1506-11.2e

Using the table below, find the appropriate minimum diameter duct for the Btu/hr requiring make-up air (vertical axis) and the static pressure measured across the duct (horizontal axis) closest to those determined in 1506-11.2a through 1506-11.2d above.

Assuring adequate combustion air for the Btu/hr input over the volume of the CAZ. (by static pressure and duct diameter)

BTU/H R	5 PA	10 PA	15 PA	20 PA	25 PA	50 PA
10,000	4"	3"	3"	3"	3"	3"
20,000	5"	4"	4"	3"	3"	3"
30,000	5"	5"	4"	4"	4"	3"
40,000	6"	5"	5"	4"	4"	4"
50,000	6"	5"	5"	5"	4"	4"
60,000	6"	6"	5"	5"	5"	4"

alternative technique
1506-11.2f

Use the calculation and table below to determine the diameter of duct necessary to meet the additional combustion air requirement for a CAZ.

50 Cu ft of air volume is required for each 1000 Btu/hr of combustion

$50 \text{ Cubic feet per hr} / 60 \text{ min} = .83 \text{ CFM of air per } 1000 \text{ Btu/hr of combustion}$

$\# 1000\text{Btu/hr} \times .83 \text{ CFM} = \text{Total CFM additional air necessary for combustion}$

Using the table below, find the duct diameter that will deliver the minimum supply flow, given the static pressure across the duct it will be installed into.

CFM of flow by duct diameter and static pressure

	5 PA	10 PA	15 PA	20 PA	25 PA	50 PA
3"	<10	10	14	18	20	28
4"	10	22	28	36	40	60
5"	30	44	56	64	74	100
6"	50	70	90	108	120	170
8"	110	150	200	240	270	360
10"	200	280	360	420	460	660

Example:

40 (1000 Btu/hr) x .83 CFM = 33.2 CFM additional air for combustion

20 Pa measured static pressure across trunk requires a 4” added duct opening to deliver 36 CFM of flow.

Install a duct of the size indicated in the table (or determined using the calculations) using the current installation procedures recommended in the WPS. If there is central air conditioning existing, an inline damper shall be installed into the duct that can be closed during the summer. The damper handle should be clearly labeled summer (closed) and winter (open) and the operation explained to the occupants and/or homeowners.

install duct
1506-11.2g

Retest the static pressure near the termination of the added duct to determine if the static pressure needed to provide the airflow into the basement is being met by the installed duct.

test installation
1506-11.2h