

**CVA requirements only apply to OPEN combustion furnaces and water heaters.** Abandoned appliances (capped off or disconnected only) must be included in CVA or room volume calculations. Heating appliances with the flex gas connector removed, the gas line shut off, the valve capped or removed, and the pipe capped are considered abandoned.

"**Confined space**" refers to an area designed for the operation of combustion appliances. An area referred to as confined space has a total volume less than 50 cubic ft. per 1000 BTUs input of all open combustion furnaces/heaters and water heaters within the space.

### Procedure for Determining If an Open Combustion Appliance Is Located in a Confined Space

1. Measure the enclosure or room: **L (length) x W (width) x H (height) = Existing Area in Cubic Feet.**
2. Total BTUs divided by 1000 x 50 cubic feet = Required Cubic Feet.
  - Here is another method: Divide the total BTU input by 2, and then drop the last zero.  
Example: 44,000 total BTU input divided by 2 = 22,000. Drop the last zero = 2,200 cu. ft.
3. If the result of 1 is less than 2, CVA **is** required.
4. If the result of 1 is equal to or greater than 2, CVA is **not** required.

### CVA Calculation Rules

Determine the required Net Free Vent (NFV) area, **per opening(s)**, by taking the total BTU input and dividing by 1000. Take the results and divide by the CVA Rule you have chosen to use.

- Example: The total BTU input is 80,000 BTUs. You have chosen rule 4. 80,000 divided by 1000 = 80. 80 divided by rule 20 sq. in. in required NFV area.

**Rule 1:** Requires two openings. CVA from **conditioned space** requires that each opening shall have a NFV area of at least **1 sq. in. for every 1000 BTUs input**. 1 upper vent within 12" of ceiling and 1 lower vent within 12" of floor venting to unconfined space. Each opening requires a **minimum 100 sq. in.**

**Rule 2:** Requires two openings. CVA supplied by **horizontal ducts** to the outside (**unconditioned space**). 1 upper duct and 1 lower duct. Each opening requires a NFV area of at least **1 sq. in. for every 2000 BTUs input**.

**Rule 3:** Requires one opening. CVA to outside (**unconditioned space**). 1 upper opening (or vertical or horizontal duct) may be used to provide the combustion air. The vent/duct must provide **1 sq. in. NFV area per 3,000 BTUs input**.

**Rule 4:** Requires two openings. CVA to the outside (**unconditioned space**). 1 upper and 1 lower vent or vertical duct opening is required. Each opening shall have a NFV area of a least **1 sq. in. for every 4000 BTUs input**.

*Note: With Rule 3, the appliance must have clearances of 1 in. on sides and back and 6 in. in front from appliance to wall/door.*

Note: In an unconditioned garage when it is considered a confined space, 1 vent either upper and/or lower and equal to 1 sq. in. per 4,000 BTU input for all applicable appliances is OK. The CVA opening can either be already installed, or installed by the Participating Contractor. Must be designed CVA.

Note: If a water heater or furnace is in an enclosure that has non-standard doors (pocket, accordion, etc.) that cannot be weatherstripped, it is OK to not weatherstrip the doors, and in addition install or increase CVA to outside if necessary.

## Calculations

### Area of a Circle (sq. in.)

**Area of a Circle = Radius x Radius x 3.14** Radius = Half the diameter

3" diameter circle = 7.1 sq. in. 4" = 12.6 5" = 19.6 6" = 28.3 7" = 38.5

8" = 50.3 9" = 63.6 10" = 78.5 12" = 113

### Vent Opening Multipliers

Note: Use **only one** of the following multipliers to calculate NFV area. Use the multiplier that will reduce the overall NFV area to the lowest term.

**Mesh, ¼ in. or larger = 90%** of the actual vent opening

**Mesh, less than ¼ in. = 50%** of the actual vent opening

**Metal louvers = 75%** of the actual vent opening

**Wooden louvers = 25%** of the actual vent opening

### Estimated BTUh Input Ratings of Unmarked Open Combustion Furnaces/Heaters and Water Heaters

#### Wall Furnaces

Single sided: 25,000 BTUh

Double sided: 50,000 BTUh

#### Floor Furnaces

Standard (usually 22" wide): 30,000 BTUh

Large (usually larger than 1 floor-joint bay): 60,000 BTUh

#### Forced Air Furnace

25,000 BTUh per burner

#### Free-Standing Heaters

Small: 25,000 BTUh

Standard (24" + 12" deep): 50,000 BTUh

#### Water Heaters

Standard: 1000 BTUh per gallon

Tankless/instantaneous: 200,000 BTUh