

General Fumigation Practices

Computing the Job

Dosage recommendations are based on cubic content.

In **square or rectangular** buildings, simply multiply the interior length by width and height.

In **irregularly shaped** buildings, find the cubic content of each unit then add the units together to find the total. In the case of peaked roofs, the average height between sidewall and top of the roof may be used as the third multiple in calculating the cubic content.

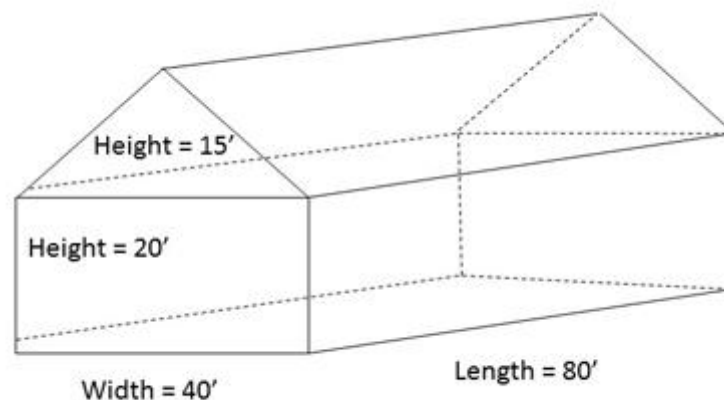
When measuring, **do not deduct for space occupied by machinery, commodities, or furnishings**. Exceptions to this rule apply to fresh fruit and vegetables or canned or bottled materials that cannot be penetrated by the gas.

Follow the recommended checklist for release and aeration procedures at the end of this chapter.

Calculations For Fumigators

Volume calculations are the basis for determining the amount of fumigant needed for enclosed spaces. They are straightforward as long as you break them down into individual steps.

Flat Storage With Triangular Loft



Multiply length x width x height

Example:

$L = 80 \text{ ft}$

$W = 40 \text{ ft}$

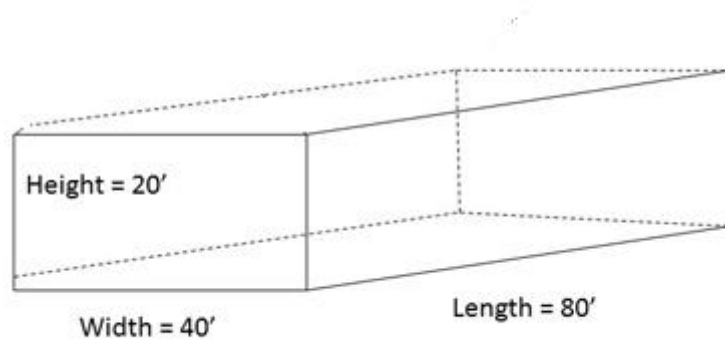
$H1 = 20 \text{ ft}$

$H2 = 15 \text{ ft}$

Break the structure into a

- 1) a **rectangular building** plus
- 2) a **triangular loft** and calculate the volume of each.
- 3) **Add the two values** to get the total volume of the structure.

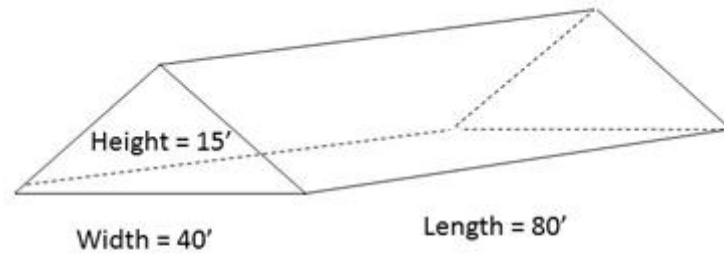
The **formula for the volume of the rectangular structure is $L \times W \times H1$.**



The example structure is 80 ft long \times 40 ft wide \times 20 ft high.

Its volume is $80 \text{ ft} \times 40 \text{ ft} \times 20 \text{ ft} = 64,000$ cubic feet.

Volume of the triangular loft equals the area of the triangle (front surface) x the length of the structure.



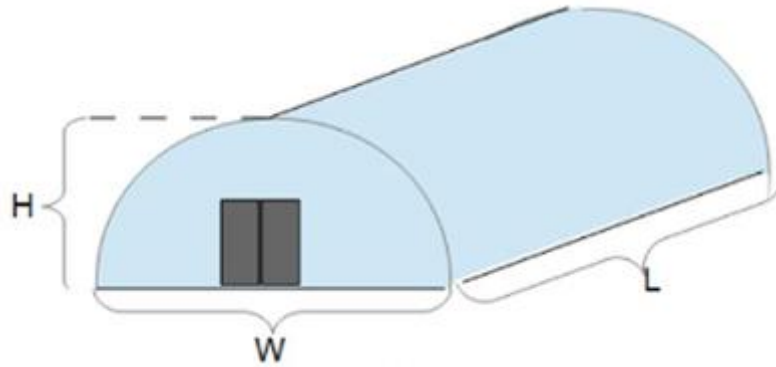
The area of a triangle = $(W \times H)/2 = (15 \times 40)/2 = 300$ sq ft

Volume = area of the triangle (300 sq ft) x 80 ft = 24,000 cu ft

Total volume of building

64,000 cu ft + 24,000 cu ft = 88,000 cu ft

Quonset Hut (Semicircular Ends)



Multiply the area of a half-circle (front surface) x length

Example:

$$\pi = 3.14$$

$$H = 12 \text{ ft}$$

$$L = 40 \text{ ft}$$

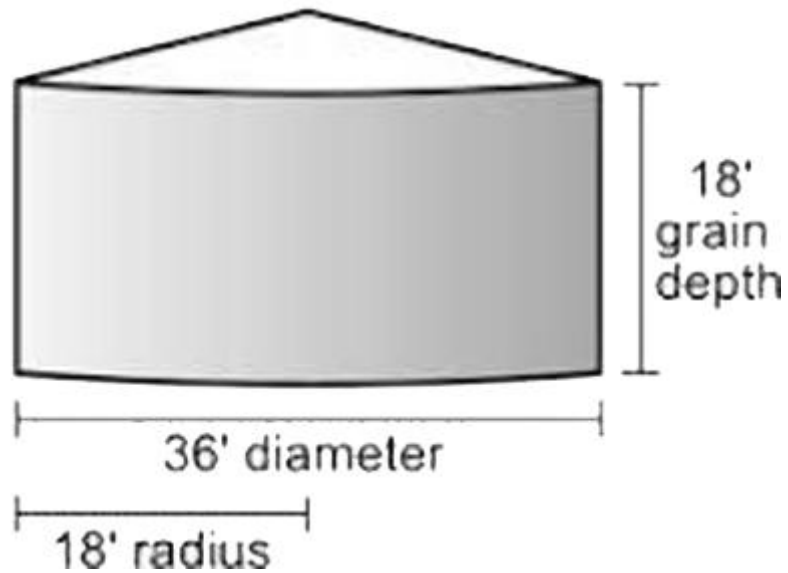
$$\text{Area of a circle} = (\pi H^2)$$

$$\text{Area of a circle} = 3.14 (12^2) = 452.2 \text{ sq ft}$$

$$\text{Area of half-circle} = 226.1 \text{ sq ft}$$

$$\text{Area of half-circle} \times \text{Length} = 226.1 \text{ sq ft} \times 40 \text{ ft} = 9,044 \text{ cu ft}$$

Cylindrical Storage (Round Bin)



Multiply the area of the base (circle) x the height

Example:

$$\pi = 3.14$$

$$H = 18 \text{ ft}$$

$$D = 36 \text{ ft}$$

$$R = 36 \text{ ft} / 2 = 18 \text{ ft}$$

$$\text{Area of a circle} = (\pi R^2)$$

$$\text{Area of a circle} = 3.14 \times (18^2) = 1,017.4 \text{ sq ft}$$

$$\text{The formula for the volume of this structure is } 1,017.4 \text{ sq ft} \times 18 \text{ ft} = 18,312.5 \text{ cu ft}$$

Good Practice Checklist For Fumigation

This checklist emphasizes steps related to life safety and fire safety. However, all items do not apply to all fumigants in all situations. This is intended as an outline for a more detailed operating procedure for fumigations.

Planning & Preparation



Become fully acquainted with site and commodity to be fumigated, including:

1. General layout of the structure, connecting and adjacent structures, and above- and belowground escape routes.
 - a. Check equipment to ensure that product flow has ceased and that equipment has been made as tight as practicable to prevent drafts and/or leaks. This applies especially to spot fumigations,
 - b. Check all spouts, conveyers, conduit heat pipes or other possible openings leading from the area to be fumigated.
2. The number and identification of persons who routinely enter the area to be fumigated and the proximity of other persons and animals.
3. The specific commodity, its condition, and mode of storage.
4. The commodity's treatment history, if available, to be aware of possible food residues.
5. Accessibility of utility service connections.



*Locate utility service connections
(Photo: Nasdonline.org)*

6. Locate the emergency shut-off stations for electricity, water, and gas.

Post current emergency telephone numbers, i.e., Fire, Police, Hospital, and Physician.

Select an appropriate EPS-registered fumigant.

1. Make sure the selected chemical or chemicals will not leave illegal residues.

2. Check, mark, and prepare the application points for spot or general fumigation.

3. Determine the dosage rates. Consider the structure's type, size, temperature, and humidity. Determine how well the structure can be sealed, any label restrictions, and the sorption of the fumigant. Fumigators develop good judgment about specific situations with experience.

Study directions, warnings, antidotes, and precautions on the label and on the manufacturer's instruction manual.

Notify local fire and police authorities and other security personnel about the proposed fumigation's location, date and time, the chemicals to be used, type of protective equipment required, and fire hazard rating.

Inform local hospital emergency rooms of your fumigation practices and the specific materials used.

Provide authorities with pertinent safety literature on the materials to be used.

Arrange for standby equipment, replacement parts, and an alternate plan of action.

Inform all employees of the operational schedule, potential hazards to life and property, and the required safety measures and emergency procedures.

Prepare warning signs for posting treated areas, provide for security of building, and arrange for watchmen when required.

Have available first aid equipment and antidotes where applicable.

Plan for application from outside the structure where possible.

Plan for ventilating the treated space and commodities when the required exposure is finished. Do this before you start treatment.

Properly identify areas used for storage of fumigant chemicals and provide the conditions required by the manufacturer's directions

- Make sure there are no open fires, motors, or light switches that could spark, or hot surfaces, such as heat pipes and electric fixtures, within the space to be fumigated.**
- Provide fans to distribute the fumigant where applicable.**
- Provide gas sampling and/or detection device.**
- Make a final check to clear all personnel and non-target animals from the space to be fumigated.**

Sources

National Pesticide Information Center: <http://npic.orst.edu/factsheets/archive/sftech.html>

<http://www.vdacs.virginia.gov/pdf/bb-heat1.pdf>

<https://www.degeschamerica.com/wp-content/uploads/2016/04/Phostoxin-Tablet-Pellet-manual.pdf>

<https://pested.osu.edu/sites/pested/files/imce/6%20Fumigation.pdf>

<http://www.extension.umn.edu/agriculture/pesticide-safety/pat/pfum/manual.pdf> magtoxin

https://www.gipsa.usda.gov/fgis/handbook/FumigationHB/FumigationHandbook_2016-03-09.pdf

General Fumigation: <https://www.uaex.edu/farm-ranch/pest-management/docs/training-manuals/AG1161.pdf>

Structural Fumigation: <http://npic.orst.edu/pest/fumigation.html>