Update
NPMA LIBRARY UPDATE
OCTOBER
2007

Insert this update into the NPMA Pest Management Library, which can be purchased from the Resource Center. Phone: 703-352-NPMA (6762); Fax: 703-352-3031

Math for Technicians

Everyone performing sales or service work in this industry uses math daily. From dilution of products to calculating areas to be treated, math is an important part of the daily work. Mistakes can be costly financially, legally, and in terms of safety. If a sales person miscalculates the square footage of an area to be treated, the cost estimate will be inaccurate.

Containers

Some containers in our industry are RTU or ready to use, removing the analytical part of a technician's responsibilities from mixing and diluting of liquids to be used in pest management applications. For example, aerosols are ready to use and don't require mixing. Many products, however, are sold to the professional in a concentrated state and will have to be measured, either using "tip and pour" method where there is a part of the container which is used to measure the product prior to mixing. One must always read and follow any label's instructions prior to mixing and applying the material. There will be specific guidelines on the label as to how much finished product is needed for a certain area.

Linear Distances

Products, including liquid soil termiticide products, often list dosage per linear foot. The most common specification on the label is "four gallons per 10 liner feet per foot of depth to the footer." Linear footage is the length along one wall. That is a wall that is 30' long is 30 linear feet. So, for a wall that is 30 linear feet that has a footer one foot below grade, the calculation would be:

$$30 \text{ linear feet} \times \frac{4 \text{ gallons}}{10 \text{ linear feet}} = 12 \text{ gallons}$$

A technician calculates linear feet.

If the footer was four feet deep (the maximum depth needed to treat to per most labels), then the calculation would be:

$$30 \text{ linear feet} \times \frac{4 \text{ gallons}}{10 \text{ linear feet}} \times 4 \text{ foot of depth} = 48 \text{ feet}$$

Linear footage is also used to calculate the spacing of termite baiting stations. For example, placement every 10 linear feet on a 30 foot building wall would take four stations; one at zero feet, one at 10', one at 20', and one at 30'.

Square footage calculations are vital to ensure label compliance for pretreats.

Square Footage

Square footage is simply length times the width. For a pad 20' x 20', the square footage would be 400 square feet. Another example is a slab prepped for a pretreat that is 35' x 45'. The square footage would be:

$$35 \text{ feet} \times 45 \text{ feet} = 1575 \text{ square feet}$$

If a product calls for treatment of one gallon per ten square feet, then the calculation would be:

$$1575 \text{ square feet} \times \frac{1 \text{ gallon}}{10 \text{ square feet}} = 157.5 \text{ gallons}$$

Caution: Spot treatments are commonly defined as "two square feet." This is not 2' x 2' as that is four square feet. Two square feet is about 1.4 feet on each side.

Proper calibration ensures optimum performance of product and efficiency of application.

Cubic Footage

There are times when labels call for a certain application per 1000 cubic feet. Cubic feet of an area is:

Length x width x height

So for a ship container that is 8' tall x 8' wide x 40' long, the cubic footage is:

$$8' \times 8' \times 40' = 2{,}560 \text{ cubic feet}$$

As an example, if a fogging material would call for one ounce per 1,000 cubic feet, the calculation would be:

$$\frac{1 \text{ oz}}{1000 \text{ cubic feet}} \times 2{,}560 \text{ cubic feet} = 2.56 \text{ ounces}$$

Calibration

Power rigs and termite rigs should be calibrated often. Many companies prefer to calibrate the rigs daily. Labels may specify a rate of application but the more important factor in calibration is to make sure that the adequate amount of product is applied.

An easy way to calibrate the rig is to use the pump setting and tip preferred for the job. Prepare for the calibration at the office by marking a five gallon bucket using water at one gallon, two gallons, three gallons, and four gallons. A permanent marker works well. To calibrate, start the rig and pump liquid (mixed or water from the tank prior to mixing) into the bucket while timing using the second hand on a watch. Stop pumping when the liquid touches one of the lines marked on the bucket. Mark down the number of gallons and the time. Gallons per minute can be calculated as:

Number of gallons pumped divided by the time in minutes.

For example, if the one gallon line was reached in 45 seconds, then the calculation would be:

$$\frac{1 \text{ gallon}}{45 \text{ seconds}} \times \frac{60 \text{ seconds}}{\text{minute}} = 1.35 \text{ gallons per minute}$$

If this rate is not acceptable, adjust pump speed or pressure to achieve desired rate.

Calibration is most important when making sure that the correct amount of product is applied. Let's go back to our earlier example of a 30 linear foot wall where we determined that for a footer at one foot, 12 gallons of product would be required, that would be four gallons per 10 linear feet. If the rig is producing 2.7 gallons per minute and you need 12 gallons, you would need to pump for just over four minutes. Let's look at the calculation:

$$12 \text{ gallons} \times \frac{1 \text{ min. of pumping}}{1.35 \text{ gallons}} = 8.8 \text{ min. or 8 min. and 48 sec.}$$

Dilution

As technicians learn early in their career, labels describe the amount of active ingredients per gallon. For example, products may state that the active ingredient in a concentration is four pounds of active ingredient per gallon. The product is then diluted.

Parts per Million

Parts per million (ppm) is one part of a substance in a million units. In terms of measurements it is one milligram or 1/1000 of a gram per liter. In English terms, it is approximately one ounce in 7,500 gallons of water or one ounce in more than a tanker truck.

Liquid Insecticide in a Compressed Air Sprayer (CAS) Tank

CAS's are generally a gallon in size. They have graduated lines on the outside of the container. One should always first fill the tank with water to the gallon line indicator. Then, one should add the amount of material needed for the proper dilution/dosage of material.

Correct dilutions will reduce chances of call backs at commercial accounts.

CALCULATIONS AT-A-GLANCE

Linear Footage = length along a line or commonly foundation

Square Footage = length of an area x width of an area

Cubic Footage = length x width x height

1 lb wettable powder per 100 gal = 1 tablespoon per gallon (approximately)

1 pint emulsifiable concentrate per 100 gal = 1 teaspoon per gal

WEIGHTS & MEASURES

1 gallon (gal.) of water weighs about 8.3 pounds (lbs.)

100 gals of water weigh about 830 lbs

1 lb = 16 ounces = 453.6 grams

1 gallon = 4 quarts

2 pints = 1 quart

1 gallon = 8 pints

1 quart = 32 fluid ounces

1 pint = 16 fluid ounces

One ounce by weight is 28.35 grams

One fluid ounce is 29 milliliters

1 pint = 16 fluid ounces = 473 milliliters

2 pints = 1 quart = 32 fluid ounces = 946 milliliters = .946 liters