DOUGLAS PRODUCTS'

GUIDE TO INSECTS OF STORED GRAIN

Get Effective Pest Control With These Great Products:

- *Dustacide 6*
- *Vapocide*
- *Py5*
- *Phosfume2*

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Angoumois Grain Moth

(Sitotroga cerealella)

Appearance

A moth with a wing expanse of 13-19 mm and a length of 6-9 mm. The forewings are clay-yellow and without markings; the rear wings are grey. The rear edges of the forewings and rear wings have long fringes.

Life History

Ideal: 30 days at 86ºF, 75% r.h.
Range: 61-93ºF
Maximum population growth rate per month: 50 times

Biology

Eggs: Laid on Grain Surface
Larvae: Immobile, develops concealed within a single grain
Adult: Pupal case often left protruding from grain. Adult moth is short lived and does not feed.

Distribution

WIll attack grain before harvest, particularly with maize. Infests only the surface layer of bulk-tored grain as the adult is unable to penetrate deeply.

Control

Dustacide, Vapocide, PY5, Phosfume2

Australian Spider Beetle

(Ptinus tectus)

Appearance

An oval beetle of 2.5-4 mm length, dark brown, with flat-lying yellowish-brown hairs. The larvae are 5-7 mm length. yellowish-white with sparse hair growth.

Life History

Ideal: 26 days at 86ºF, 70% r.h.
Range: 72-90ºF minimum r.h. 25%
Maximum population growth rate per month: 20 times

Biology

Eggs: Laid at random
Larvae: Immobile, somes concealed, burrows into stored food.
Adult: Short lived it does not feed though is a strong flier and attracted to light.

Distribution

Originally only found in Australia, now practically world-wide.The beetles and larvae are omnivorous and attack grain and grain products.

Control

Dustacide, Vapocide, PY5, Phosfume2

Cadelle

(Tenebroides mauritanicus)

Appearance

A slim, flat, 6-11 mm-long beetle, dark brown to black; ventral side, antennae and legs are red-brown. The dirty-white larva, has a black head, behind this a black shield, two black hooks at the end of the body and long body hairs. Both larvae and adult attack grain, going from kernel to kernel, feeding on the germ.

Life History

The life cycle may be as short as 70 days, but it may be much longer under conditions unfavorable to the insect's development. The females generally live for a year, and have been kept alive for more than 3 years.

Biology

Eggs: Female lays up to 1000 eggs in groups of 10-60 near supply of food.
Larvae: Burrow into woody timbers in storehouse and infest new grain. Reemerge whenever new grain is added.
Adult: Common in old grain bins and flour mills. External feeder of corn, rice, flour, cereals, oats, nuts, fruits and spices. Often long lived, often more than a year.

Distribution

Worldwide. Serious pest in flour mills, granaries, warehouses & stores.

Control

Dustacide, Vapocide, PY5, Phosfume2

Carpet Beetle

(Tenebroides mauritanicus)

Appearance

A 3-5 mm long beetle. Wing covers and neck shield have black scales with a white, wavy design. The wing seam, margins and parts of the neck shield have marked red scales. The olive brown larvae have black-brown hairs and grow to a length of 6 mm.

Life History

Ideal conditions for growth is 9 months at 81ºF. Carpet beetle can survive in very dry conditions.

Biology

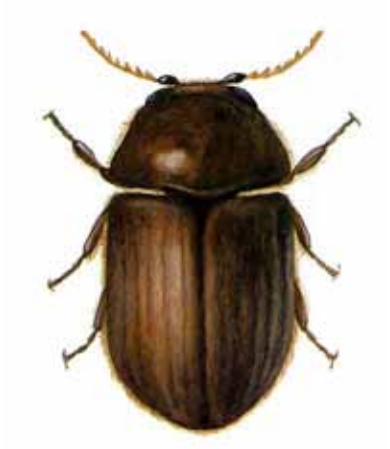
Eggs: Laid into fabric or in cracks or folds.
Larvae: Mobile, cast skins left throghout infested material.
Adult: Long lived, does not feed on stored materials. Is a strong flier.

Distribution

Primarily throughout Europe and North America

Control

Dustacide, Vapocide, PY5, Phosfume2



Cigarette Beetle

(Lasioderma serricorne)

Appearance

A 2-4 mm long, squat beetle, it is reddish-brown and covered with fine hairs; the head is hidden under the domed neck shield. The antennae are saw-like. The larvae are very hairy and grows to a length of up to 4 mm.

Life History

Ideal: 26 days at 86ºF but can survive in a range: 72-99ºF. Population can reproduce at a rate of 20 times a month.

Biology

Eggs: Laid at random.
Larvae: Immobile, sometimes concealed, burrows into stored food.
Adult: Short lived, does not feed is a strong flier that is attracted to light.

Distribution

They are frequently carried from warmer areas to temperate zones, where they can only survive in warm storages.

Control

Dustacide, Vapocide, PY5, Phosfume2

Coffee Bean Weevil

(Araecerus fasciculatus)

Appearance

Adult body length 3-5mm, body shape globular with long legs and long antennae with last three segments forming a club, elytra with light and dark patches; elytra shortleaving last abdominal segment exposed.

Biology

Eggs: Lays eggs in the soft kernels of corn and continues to breed after corn has been harvested and placed into storage.
Larvae:The footless, slim larvae are curved and hairy and grow to a length of 5-6mm
The larvae tunnel into and hollow out stored food products.
Adult: Strong flyer, bores circular holes when they emerge.

Distribution

Potentially invasive weevil species from the Caribbean countries to the United States.
This weevil is found in many tropical countries and is extremely abundant in the southern states.

Control

Dustacide, Vapocide, PY5, Phosfume2

Bean Weevil

(Acanthoscelides objectus)

Appearance

With a characteristic weevil shape, it is covered in short hairs with wing cases that are short and patterened. Their antennae is grey and reddish. Femus of hind lef has three tooth-like spines.

Life History

Ideal: 27 days at 86ºF, 80 r.h.
Range: 59-91ºF
Maximum Population Growth rate per month: 25 times

Biology

Eggs: Laid loose or lodged in cracks in seed coat.
Larvae: Bores into seed making round translucent 'window' in seed.
Adult: Short lived, it doesnot feed on seed. Runs quickly and flies very well.

Distribution

The bean weevil is found worldwide

Control

Dustacide, Vapocide, PY5, Phosfume2

Confused Flour Beetle

(Tribolium castaneum)

Appearance

A slim beetle of 3-4 mm length, of uniform red-brown to black color. Larvae are elongated and a light brown. They have two dark pointed projections on the last body segment.

Life History

Ideal: 20 days at 95ºF, 75% r.h.
Range: 72-162ºF, survives very dry conditions
Maximum population growth rate per month: 70 times

Biology

Eggs: Laid at random.
Larvae: Mobile, no concealed.
Adult: Long lived, feeds often leaving an unacceptable taint. A strong flier.

Distribution

The confused flour beetle is of Indo-Australian origin and is found in temperate areas, but will survive the winter in protected places.

Control

Dustacide, Vapocide, PY5, Phosfume2

Copra Beetle

(Necrobia rufipes)

Appearance

The 3.5-6 mm long beetle is metallic green-blue in color and has red legs. When fully grown, the slim, grey-brown larva reaches a length of about 10 mm.

Life History

Ideal: Thrives under warm (86 to 93°F) and damp conditions.
Range: Minimum temperature and humidity requirements for growth of this insect are 69°F and 50% relative humidity respectively.

Biology

Eggs: Deposited in small clusters in protected depressions on the food surface and hatch in four to five days.
Larvae: Bore into food and pass through 3-4 instars and spin coon before emerging as adults, about 21 days.
Adult: Adult beetles are strong fliers, but feed on the surface of the infested commodity. Adults are very active and run across the surface of the infested commodity.

Distribution

The Copra Beetle is found worldwide.

Control

Dustacide, Vapocide, PY5, Phosfume2

Dried Fruit Beetle

(Carpophilus hemipterus)

Appearance

The dried fruit beetle is brown and 2 - 4 mm long. The wing covers have two yellow spots, are short and do not completely cover the abdomen. The antennae are slender with the last three segments distinctly enlarged. Larvae are white (darkening to grey as they mature), and grow up to 6 - 7 mm in length.

Life History

Ideal: 12 days at 90ºF, with high humidity
Range: 64-90ºF, at 70% r.h.

Biology

Eggs: Laid at random.
Larvae: Mobile, feedon soft/mouldy parts of food
Adult: Lone lived, feeds, flies and is attracted to lights.

Distribution

The dried fruit beetle can be found in a wide variety of ripe and decomposting fruit. This pest has also been found in stored corn, wheat and rice.

Control

Dustacide, Vapocide, PY5, Phosfume2

Drugstore Beetle

(Stegobium paniceum)

Appearance

A 2-4 mm long beetle, reddish-brown color, with hairs on its oval body. The head is hidden under the uniformly-domed neck shield; the wing covers are finely patterned with lines of dots; the last three antennal segments are particularly long. The larvae grow to a length of 5 mm.

Life History

Ideal: 26 days at 86ºF, 60-90% r.h.
Range: 59-93ºF, minimum r.h. 35%

Biology

Eggs: Laid at random.
Larvae: Immobile, sometimes concealed, burrows into stored commodoties.
Adult: Short lived, does not feed, not known to fly.

Distribution

The drugstore beetle is distributed worldwide, but it is found more often in temperate climates. It feeds on a wide range of dried commodities.

Control

Dustacide, Vapocide, PY5, Phosfume2

Golden Spider Beetle

(Niptus hololeucus)

Appearance

The Golden Spider Beetle is brown and covered with golden yellow hair. The body shape resembles a spider. It has long thin legs segmented antennae. The larvae are yellow-white grubs with a brown head. Adult beetle length is 4mm to 5mm.

Life History

Ideal: The optimum temperature for development is 91°F at 45 days.
Range: Between 68-95°F

Biology

Eggs: Hatch in 11 to 20 days at 68°F
Larvae: Larval period lasts about 150 days; and the pupal period, 18 to 26.
Adult: Long-lived, surviving for up to 1.5 years.

Distribution

Can be found infesting a wide variety of cereal based food products. It is a temperate species originating in West Asia but now cosmopolitan.

Control

Dustacide, Vapocide, PY5, Phosfume2

Grain Mite

(Tyroglyphus farinae)

Appearance

Flour or grain mites are pale, pearly or grayish white, with legs varying in color from pale yellow to reddish-brown. Each leg has one claw at the end. The males are from 0.3 to 0.4 mm long, and the female is from 0.3 to 0.6 mm. The males have enlarged forelegs which bear a thick spine on the ventral side.

Life History

Ideal: Thrive when moisture is at 24% with temperatures of 68-77°F
Range: All individuals die if moisture is under 13.4%. Grain in the range of 15-18% moisture content is ideal.

Biology

Eggs: A female may deposit between 100 and 500 eggs on food over 10 to 12 days.
Larvae: The larval and nymphal stage may be 19 to 20 days
Adult: 2-5 weeks

Distribution

Grain mites are cosmopolitan, although they are more common in temperate regions with cool moist climates.

Control

Dustacide, Vapocide, PY5, Phosfume2

Granary Weevil

(Sitophilus granarius)

Appearance

A weevil of 3-5 mm length; black-brown (red-brown shortly after hatching); the head ends in a slightly curved proboscis; the neck shield has depressed markings and is almost as long as the longitudinally-grooved wing covers.

Life History

Ideal: 25 days at 86ºF, 70% r.h.
Range: 57-95ºF minimum r.h. 40%
Maximum population growth rate per month: 25 times

Biology

Eggs: Laid singly in prepared holein grain and covered with waxy plug
Larvae: Immobile, develop concealed within the grain
Adult: Long lived, feeds, winged species fly, infestations cause grain heating.

Distribution

The granary weevil is the main stored grain pest in countries of the temperate zones.

Control

Dustacide, Vapocide, PY5, Phosfume2

Groundnut Bruchid

(Caryedon serratus)

Appearance

These dark reddish-brown pests has smudgy black spots on the wing covers and is 3-7 mm long.

Life History

Ideal: The life cycle from egg to adult is completed in about 40 days under optimum conditions.

Biology

Eggs: The female bruchid attaches its milky white eggs to the walls of the pod. They hatch in about 8 days.

Larvae: Characteristically bore through the dry shell of the nuts and after full development, the last larval instar comes outside from the pods by making emergence hole and forms cocoons outside.

Adult: The adults have feign death, when touched or disturbed and have a tendency of taking shelter inside the empty cocoons shells for long periods. They are good fliers.

Distribution

It is found in the tropics on whole and shelled groundnuts, both in the field and in store.

Control

Dustacide, Vapocide, PY5, Phosfume2

Indian Meal Moth

(Plodia interpunctella)

Appearance

A moth with a wing expanse of 14-20 mm. When at rest with closed wings, it is 8-10 mm long. The outer halves of the forewings are bronzy; the inner halves light grey to ochre yellow. The caterpillars are yellowish white, some-times reddish or greenish, with a brown head; they grow to a length of 17 mm.

Life History

Ideal: 30 days at 86ºF, 756% r.h.
Range: 64-95ºF
Maximum population growth rate per month: 60 times

Biology

Eggs: Laid at random.
Larvae: Mobile, produce large quantities of silk.
Adult: Short lived, does not feed. Flies, active at dusk and dawn.

Distribution

Found in warehouses, silos, mills and food processing plants, they infest dry vegetable products. Feeds on dried fruit, nuts, almonds, nougat, and other chocolate fillings but also grain, grain products, confectionary and drugs.

Control

Dustacide, Vapocide, PY5, Phosfume2

Khapra Beetle

(Trogoderma granarium)

Appearance

An oval beetle 2-3 mm long, dark brown with smudgy yellowish-brown and reddish-brown strips on the wing covers and covered with fine hairs.

Life History

Ideal: Prefers hot, dry climates but can survive in temperatures as low as 17° F.

Larval development requires a minimum of 70°F/21°/RH 75%.

Biology

Eggs: Lay average of 50-90 eggs over 3-14 days @ 104°F/25% RH

Larvae: Larval development requires a minimum of 70°F/21°/RH 75% and May enter diapause under favorable conditions when it becomes difficult to control with insecticides.

Adult: Usually live for 2 weeks, but may live for several months depending on temperature.

Distribution

The larvae is a very serious stored product pest but the beetle itself does no damage. It is found in warehouses, silos, mills, breweries, and malt plants.

Control

Dustacide, Vapocide, PY5, Phosfume2

Larder Beetle

(Dermestes lardarius)

Appearance

Both adult and Larvae feed off a variety of animal-based foods, such as raw skins, raw hides and carcasses, cured meat, poultry houses and are a pantry pest where dog food is stored.

Life History

Optimal development temperatures are 64°- 68°F

Biology

Eggs: Females lay singular batches during the spring and summer months on suitable larval food or in cracks and crevices where food is stored.

Range from 100-800 and hatch in about 12 days.

Larvae: Wanders to find a suitable place for pupation which lasts 3-15 days.

Adult: Development time egg to adult usually takes 2-3 months or longer. Not unusual to have 1 generation per year. Avoid light when mating and during egg laying.

Distribution

Larder Beetles are cosmopolitan, distributed around the world.

Control

Dustacide, Vapocide, PY5, Phosfume2

Lesser Grain Borer

(Rhizopertha dominica)

Appearance

A beetle of 2-3 mm length, red-brown to black-brown, and slim. The hood shaped, rounded neck shield extends beyond the head; the spots on the shield gradually become smaller towards the rear. The larvae are white, and have brown head capsules.

Life History

Ideal: 25 days at 93ºF, 70% r.h.
Range: 68-100ºF, minimum r.h. 30%
Maximum population growth rate per month: 20 times

Biology

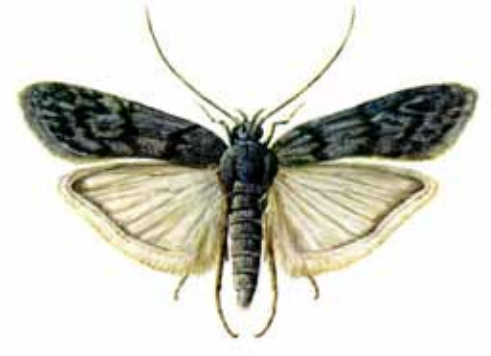
Eggs: Laid in clusters as females bore into grain.
Larvae: Mobile while young, immobile wile older, concealed in grian or flour
Adult: Long lived, feeds and are strong fliers. They are adept burrowers.

Distribution

The lesser grain borer thrives best in temperate zones.

Control

Dustacide, Vapocide, PY5, Phosfume2



Mediterranean Flour Moth

(Ephestia (Anagasta) kuehniella Zell)

Appearance

A primary pest of grain, which may be attacked in the field, although most damage occurs while grain is in storage. Attacks all types of cereal grains, particularly corn and wheat.

Life History

Ideal: Eggs hatch in 3 days at 80-98°F
Can reproduce 3-4 generations per year under favorable conditions.

Biology

Eggs: Female lays 116-678 small white eggs in accumulations of flour, meal, waste grain and other food sources.
Larvae: Spin into silken tubes and remain until fully mature – approx. 40 days.
Then leave area and move to new location and spin cocoons that turn to pupae.
Adult: Non-feeding, Short lived.

Distribution

Cosmopolitan insect of stored goods. Found in temperate areas. Most troublesome pest of flour mills.

Control

Dustacide, Vapocide, PY5, Phosfume2

Rice Weevil

(Sitophilus oryzae)

Appearance

Similar in appearance to the granary weevil but is smaller (2.3-3.5 mm long) and has reddish spots on the brown wing covers.

Life History

Ideal: Optimum conditions for Rice Weevil activity are 80-86°F. 75-90% relative humidity and grain moisture content of 13.5-17.6%. Minimum life cycle of 28 days.

Biology

Eggs: Laid in stored grains and in cereals in the field by flying adults. Female lays 300-400 eggs. Eggs hatch in about 3 days.
Larvae: Feed inside the grain kernel for average of 18 days.
Adult: The adult Rice Weevil lives on an average of 4-5 months. Able to fly and is
attracted to light in adult stage.

Distribution

A dangerous stored grain pest in warmer climates; it infests all types of grain and is often found together with granary weevils.

Control

Dustacide, Vapocide, PY5, Phosfume2

Rusty Grain Beetle

(Cryptolestes ferrugineus)

Appearance

A 1.5-2 mm long beetle, flat, wing covers almost twice as long as wide, reddish-brown, head and neck shield relatively large; long, fine antennae.

Life History

Ideal: 23 days at 91ºF, 70% r.h.
Range: 64-108ºF, 40-90% r.h., survives cold conditions
Maximum population growth rate per month: 55 times

Biology

Eggs: Laid at random.
Larvae: Mobile, not concealed.
Adult: Long lived, feeds, flies, walks rapidly, able to enter packaged foods through very small cracks.

Control

Dustacide, Vapocide, PY5, Phosfume2

Sawtoothed Beetle

(Oryzaephilus surinamensis)

Appearance

A slim beetle 2.5-3.5 mm long, dark brown; neck shield has two deep longitudinal grooves and six sharply-pointed projections on each side. The slim whitish-yellow larvae are freely mobile and grow to a length of 3.5-4 mm.

Life History

Ideal: 20 days at 100ºC, 80% r.h.
Range: 64-100ºC, 10-90% r.h., survives cold conditions
Maximum population growth rate per month: 50 times

Biology

Eggs: Laid at random
Larvae: Mobile, not concealed
Adult: Long lived, feeds, flies and walk rapidly. Easily enters package foods.

Distribution

Found in warehouses, silos, mills, and food processing plants; it infests grain and grain products.

Control

Dustacide, Vapocide, PY5, Phosfume2

Warehouse Moth

(Ephestia elutella)

Appearance

A moth with a wing span of 16 mm The adult moth has brownish grey forewings crossed with two light bands. The hindwings are paler and plain grey. The caterpillar is dark to start with, becoming yellow with a dark line down its back, and a dark brown head. The pupae are light brown turning black before the adult emerges.

Life History

Ideal: 28 days at 86ºF, 75% r.h.
Range: 63-99ºF
Maximum population growth rate per month: 60 times

Biology

Eggs: Laid at random
Larvae: Mobile, produce large quantities of silk
Adult: Short lived, does not feed, flies well at dusk and dawn

Distribution

These moths are often found in warehouses and other areas where food or tobacco is stored.

Control

Dustacide, Vapocide, PY5, Phosfume2

Dustacide 6

- Dustacide 6 is 6% Malathion dust which provides residual protection from insect damage to uninfested grain.
- Can be mixed uniformly throughout the commodity during transfer or raked into the top six layers of the commodity, forming a surface protectant barrier.
- When applied per label instructions, Dustacide 6 controls the adult and larvae stages of labeled insects.
- Safe guards your investment.

Vapocide

- Vapocide is a versatile 5% DDVP ready-to-use fogging product.
- Can also be used as a space and contact spray.
- Designed for use in the control of exposed stages of listed stored product insects infesting facilities.
- Used to contain stored grain pests in non-perishable, packaged, bagged, raw or processed food commodities.
- Approved application areas include warehouses, silos, bulk bins, food processing plants and grain storage facilities.

Pyrethrin 5

- Py5 is a 0.5% pyrethrin that can be used as a spray or fog.
- Use in your regular preventative maintenance program or in the event of an infestation.
- Eliminate all labeled insect stages on contact.
- Is a ready-to-use insecticide designed for use in a variety of applications.
- Can be applied by hand or with an electronic applicator.
- Stain and odor free formulation!

Phosfume2

- Extreme penetrating power and the ability to diffuse in the most highly packed commodities.
- Phosfume2* is the weapon that every applicator needs in their arsenal.
- Phosfume2 kills all accessible stages of insects and rodents while protecting germination and preserving your commodities original color.
- Phosfume2 can be applied by hand, automatic dispenser, or probe across a variety of applications making it viable in even the simplest of applications.
- Protect your bottom line by using Phosfume2 to eliminate pests in raw food commodities, processed commodities, as well as non food applications!

*Phosfume2 is a restricted use pesticide.

Exposure Conditions For All Phosphine Fumigations

The following table may be used as a guide in determining the minimum length of the exposure period at the indicated temperatures:

Minimum Exposure Periods For This Product		
Temperature	**Pellets**	**Tablets**
40° F (5° C)	Do not Fumigate	Do not Fumigate
41° F - 53° F (5°-12° C)	8 days (192 hours)	10 days (240 hours)
54° F - 59° F (12°-15° C)	4 days (96 hours)	5 days (120 hours)
60° F - 68° F (16°-20° C)	3 days (72 hours)	4 days (96 hours)
Above 68° F (20° C)	2 days (48 hours)	3 days (72 hours)

Maximum Allowable Dosage For Fumigations With This Product		
Product	**Per 1000 cu. ft.***	**Per 1000 bu.***
Pellets	725	900
Tablets	145	180

*Maximum dosage for Dates, Nuts & Dried fruits is 200 Pellets or 40 Tablets per 1000 cu. ft.; or 250 Pellets/50 Tablets per 1000 bu.

Raw Agricultural Commodities, Animal Feed And Feed Ingredient Which May Be Fumigated With This Product		
Almonds	Filberts	Safflower seed
Animal Feed and feed ingredients	Flower seed	Seed & Pod vegetables
Barley	Grass seed	Sesame Seeds
Brazil Nuts	Millet	Sorghum
Cashews	Oats	Soybeans
Cocoa Beans	Peanuts	Sunflower seeds
Coffee Beans	Pecans	Triticale
Corn	Pistachio nuts	Vegetable seed
Cottonseed	Popcorn	Walnuts
Dates	Rice	Wheat
	Rye	

Dosage For Various Fumigation Types		
Type of Fumigation	**Pellets**	**Tablets**
Barges	300-900/1000 bu. 250-725/1000 cu. ft.	60-80/1000 bu. 50-145/1000 cu. ft.
Bulk stored commodities in flat storage, bunkers and commodoties stored on ground loosely piled under gas tight covering	450-900/1000 bu. 350-725/1000 cu. ft.	90-180/1000 bu. 70-145/1000 cu. ft.
Farm Bins (Butler Type)	450-900/1000 bu. 350-725/1000 cu. ft.	90-180/1000 bu. 70-145/1000 cu. ft.
Non-food products	150-450/1000 cu. ft.	30-90/1000 cu. ft.
Nuts, dates or dried fruit in bulk	125-250/1000 bu. 100-200/1000 cu. ft.	25-50/1000 bu. 20-40/1000 cu. ft.
Nuts, dates or dried fruit in storage boxes	100-200/1000 cu. ft.	20-40/1000 cu. ft.
Packaged commodities (bagged grain, process foods, etc.) in sealable enclosures	150-450/1000 cu. ft.	30-90/1000 cu. ft.
Railcars, containers, trucks, vans and other transport vehicles	225-500/1000 cu. ft.	45-145/1000 cu. ft.
Space fumigation such as cereal mills, feed mills, food processing plants & warehouses	100-300/1000 cu. ft.	20-60/1000 cu. ft.
Shipholds	200-400/1000 bu. 150-330/1000 cu. ft.	40-80/1000 bu. 30-66/1000 cu. ft.
Stored beehives, supers and other beekeeping equipment for wax moth control and Africanized honeybees with tracheal mites and foulbrood	150-225/1000 cu. ft.	30-45/1000 cu. ft.
Stored Tobacco	100-250/1000 cu. ft.	20-50/1000 cu. ft.
Vertical Storages (such as silos, concrete bins, steel bins, etc.)	200-900/1000 bu. 150-700/1000 cu. ft.	40-180/1000 bu. 30-140/1000 cu. ft.
Commodity in small containers	1-2 per 10 cu. ft.	-

Higher dosages should be considered in structures that are of loose construction and in the fumigation of bulk stored commodities in which diffusion will be slowed and result in poor distribution of hydrogen phosphide gas.

Transportation Instructions

The United States Department of Transportation (DOT) classifies aluminum
phosphide as “Dangerous When Wet” material and it must be transported in accordance with DOT regulations.

TRANSPORT DESIGNATIONS - The following transport designations apply to aluminum phosphide.

Proper Shipping Name:	Aluminum Phosphide
Hazard Class:	4.3
Identification No.:	UN 1397
Packing Group:	PGI
Shipping Label:	Dangerous When Wet/Poison
Shipping Placard:	Dangerous When Wet

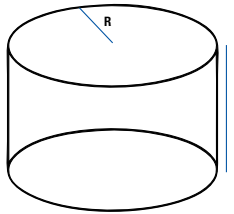
TRANSPORTATION SPECIAL PERMIT - EXEMPTION DOT-E 11342

Purpose and Limitation: This exemption authorizes the transportation in commerce of an aluminum phosphide based fumigant/insecticide in a limited number of specially designed containers transported by certain private motor vehicles without placards. This exemption provides no relief from any regulation other than as specifically stated herein.

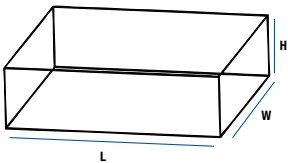
Modes of Transportation Authorized: Motor Vehicle
(Only private motor vehicles used in pest control operations are authorized to transport the packages covered by the terms of this exemption.)
NOTE: You must have a copy of this exemption with you during transportation.
A copy of Exemption DOT-E 11342 can be obtained from:
DOUGLAS PRODUCTS AND PACKAGING COMPANY AT:
(816) 781-4250.
ADDRESS: 1550 EAST OLD 210 HIGHWAY, LIBERTY, MO 64068

Commonly Used Volume Equations

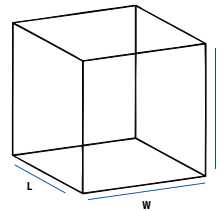
Cylinder: 3.14159 x r2 x H



Rectangle: L x W x H

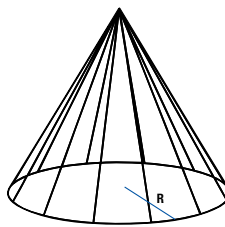


Cube: a x a x a



Cone: (3.14159 x r2 x H)/3

pi=3.14159 r2=radius squared



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Notice

The information contained in this booklet is for reference purposes only. Please refer to the actual product labels for restrictions, approved uses and complete instructions including personal protective equipment.

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