



NUMBER 4874

Fungitrol™ 440S fungicide

EPA Registration No. 1529-43
EINECS No. 259-627-5 (IPBC)

Description

Fungitrol 440S fungicide is a 40% IPBC in organic solvents that is a highly effective, broad-spectrum fungicide/mildewcide and algacide that offers broad protection against degradation, discoloration and defacement caused by mold, mildew, and algae.

Key Attributes

Fungitrol 440S fungicide is used primarily as a dry-film mildew protector for paint, coatings, stains, and more. Other applications include adhesives, metalworking fluids and printing inks. It is easily incorporated into water-based or solvent-based formulations. It can be added efficiently at the appropriate formulation stage (i.e., prior to letdown). The product exhibits good stability with ionic surfactants and emulsifiers.

Applications and Usage Notes

Adhesives

Fungitrol 440S fungicide can be used as an additive to non-medical, non-food use natural and synthetic adhesive formulations and caulks to prevent the growth of fungal organisms in the material both in the wet state and in the dry film of the finished product. Recommended use levels are between 0.05 – 0.625% wet formulations weight. This product should be added toward the end of the production cycle with good agitation to ensure a uniform distribution. For example, to inhibit the growth of mildew on a latex-based wall cover adhesive for a non-food area, add 0.5% (5 lbs. of Fungitrol 440S fungicide per 1000 lbs. of latex-based adhesive formulation) of this product to the latex-based formulation.

Aqueous Metalworking, Cutting, Cooling and Lubricating Concentrates

To inhibit the growth of fungi in an aqueous metalworking, cutting, cooling, or lubricating concentrate, add an amount of this product that will give up to 2,500 ppm in the diluted fluid. The amount required in the concentrate will depend on the end use dilution. For example, if the desired level of this product in the diluted fluid is 250 ppm and the end use dilution of the fluid is 5%, then a 0.5% concentration of this product is required in the concentrate (250ppm / 0.05=5,000 ppm or 0.5%). Use levels are 0.05 – 0.5%.

Aqueous Metalworking, Cutting, Cooling and Lubricating Fluids

To inhibit the growth of fungi in an aqueous metalworking, cutting, cooling or lubricating fluid, add up to 2,500 parts per million (0.25% v/v) of this product to the diluted fluid (1 quart per 100 gallons of solution or 2.5 liters per 1000 liters). This product may be added to the fluid at the time it is prepared (diluted) or to the reservoir (sump) containing the fluid after it is put into use. If it is added to the reservoir, the fluid should be circulated after addition to ensure mixing. Use levels are 0.05 – 0.5%



Cordage

Fungitrol™ 440S fungicide may be used as a mildewcide in both aqueous and solvent based process formulations which coat cordage. Typical use levels of this product will range from 0.5 – 2.5% of the process formulations used in the processing of these cordages. This product should be added to the process formulation at the end of the production cycle with good agitation to prevent possible mechanical losses and to ensure a uniform distribution. As an example, to inhibit the growth of mildew on cordage intended for a non-food area, add 1.25% (12.5 lbs. FUNGITROL 440S per 1000 lbs. of process formulation) of this product to the process formulation.

Inks

Fungitrol 440S fungicide may be used in aqueous-based ink solutions for protection of these solutions against attack by fungal organisms. It is recommended that this product be added at the end of the production cycle with good agitation. This product will generally impart protection when used at levels of 0.05 – 3.0% of active ingredient based on the formula weight.

Paints and Stains

Fungitrol 440S fungicide used in solvent and waterborne paints and stains will inhibit the growth of mildew. Addition should be at the end of the manufacturing process and allowed to mix long enough to be adequately dispersed and should not be added to hot paint. Typical levels for protection against mildew on painted surfaces are 0.25 – 1.2% by weight on wet paint. For example, house paint with a wet density of 10 lbs. per gallon would use 2.5 – 12.0 lbs. of this product per 100 gallons of wet paint. Where the climate is severe and mildew growth is a major problem for painted surfaces, more would be required, as much as 2.0% by weight in the paint. For interior paint use, approximately half the exterior concentration should be used, 0.1 – 0.6% by weight in the paint. Appropriate levels are best determined by field trials. Use rates are listed at 0.1 – 2.0%.

Plastics and Plastic Coatings

Fungitrol 440S fungicide may be used to prevent surface mildew growth on plastic items such as shower curtains, cable and wire insulation and sun umbrellas. Intended plastics include polymers such as PVC. Use levels of 0.5 – 2.5% by weight of the plastic are generally adequate. This product should be dispersed in the plasticizer or color concentrate before it is incorporated into the resin to ensure a uniform distribution. Use of this product is not recommended if the processing heat is above 350°F for prolonged periods, nor should it be used in a plastic that will be in contact with food or medical device applications.

Paper Coatings

Fungitrol 440S fungicide may be used as a mildewcide in both aqueous and solvent based coatings which are applied to paper and cardboard substrates. This product can be used to prevent mold and mildew from growing on products such as: corrugated cardboard or soap wrappers, wall covers, non-food contact packaging materials and non-food contact paper tapes. Use levels of this product range from 0.05 – 2.0% of this product by weight. This product should be added at the end of the production cycle and with good agitation to prevent possible mechanical losses and to ensure uniform distribution. As an example, to inhibit growth of mildew on corrugated cardboard intended for a non-food packaging, add 1.25% (12.5 lbs. Fungitrol 440S fungicide per 1000 lbs. of coating material) of this product to the coating material formulation.

Wood Preservation

Fungitrol 440S fungicide is a liquid designed for use as an additive to interior or exterior protective coatings to inhibit the growth of mildew on the film surface. It is also recommended as a wood preservative for use in above-ground applications. All recommendations of use levels are in percentage by weight and refer to this product. Dosage ranges are given for the various applications to indicate the approximate levels for a particular application. Exact levels of use should be determined by field trials.

Fungitrol 440S fungicide may be applied from solvent solutions or aqueous dispersions to new lumber, plywood, particle board, and more, to prevent the growth of mildew, sapstain and wood rot on these substrates. This product is recommended for use on wood in above-ground use only.

Treating solutions may be prepared by diluting this product in alcohols or aromatic solvents or by dispersion in water. Levels of 0.5 – 3% of this product are suggested, depending upon the severity of conditions for end use and the extent of time that protection is required.

For freshly sawn lumber, a concentration of 0.5% of this product is suggested as a starting level. A one-minute dip at ambient temperatures in a solution or aqueous dispersion containing 0.5% of this product should be adequate to control the development of mildew and sapstain organisms on the lumber. Because of the great variation in susceptibility of fresh sawn lumber relating to the type of wood, sawing and storage techniques, conditions of humidity, method of treatment, etc., it is usually necessary to carry out field tests to determine the most appropriate means of application and the optimum concentration of this product to be used within the range specified.

For best results, lumber should be treated within twenty-four hours after it is sawed. The lumber should be completely immersed in the treating bath, and the treating vat designed to permit easy immersion and removal and to minimize spillage. The vat may be cleaned by emptying and rinsing with a suitable solvent or by use of a detergent solution. To add additional product while treating, first prepare the proper solution or emulsion in a separate container (of wood, plastic or stainless steel construction) and add to the treating vessel.

After treatment, lumber should be stacked in a properly maintained seasoning yard with good drainage so that no water will accumulate in any area. The yard should be kept free from weeds and vegetation, which may hold moisture and promote growth of decay and stain producing fungi. All debris and lumber scraps should be removed from the area. A properly laid out yard should take advantage of prevailing winds to permit good air circulation. Main alleys should be at least 16 feet wide. Stack foundations should be sufficiently elevated to permit ready access of air to the pile, and allow water to drain off quickly.

Typical Product Properties

Chemical structure	$ \begin{array}{cccccccc} & & \text{H} & & \text{O} & & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & & & & & \\ \text{I} - \text{C} \equiv \text{C} - & \text{C} - \text{O} - & \text{C} - \text{N} - & \text{C} - & \text{H} \\ & & & & & & & & & \\ & & \text{H} & & \text{H} & & \text{H} & \text{H} & \text{H} & \text{H} \end{array} $
Chemical name	Carbamic acid, butyl-, 3-iodo-2-propynyl ester
Other names	3-iodo-2-propynyl butylcarbamate, IPBC
Formula	C ₈ H ₁₂ INO ₂
CAS No.	55406-53-6
Description	Clear, amber liquid
Specific gravity (H ₂ O = 1)	1.16–1.17
Percent active	40%
Odor	Characteristic
Stability	Stable in pH range of 3–11

General Efficacy

Fungitrol™ 440S fungicide exhibits superior fungi, algae and bacteria control against a wide variety of organisms (see Table).

Agar Inhibition Data (values for active ingredient)

Test Organism	Minimum Inhibitory Concentration (MIC), ppm
Mold/Mildew/Yeast/Fungi	
<i>Alternaria tenuis</i>	5.0
<i>Aspergillus glaucus</i>	4.0
<i>Aspergillus niger</i>	0.6-5.0
<i>Aspergillus oryzae</i>	4.0
<i>Aureobasidium pullulans</i>	4.0-6.0
<i>Candida albicans</i>	6.0-8.0
<i>Chaetomium globosum</i>	5.0
<i>Gliocladium sp.</i>	8.0

<i>Penicillium brevicaula</i>	1.0
<i>Penicillium funiculosum</i>	4.0-6.0
<i>Saccaromyces cerevisiae</i>	5.0
<i>Talaromyces flavus</i>	6.0
<i>Trichoderma viride</i>	10.0
Algae	
<i>Chlorella pyrenoidosa</i>	8.0
<i>Oscillatoria sp.</i>	<50.0
Bacteria	
<i>Bacillus subtilis</i>	50.0
<i>Escherichia coli</i>	100.0
<i>Klebsiella pneumoniae</i>	50.0
<i>Pseudomonas aeruginosa</i>	250 -1000

Solubility

Fungitrol™ 440S fungicide exhibits excellent solubility characteristics in non-aqueous solvents, including ionic and non-ionic surfactants, emulsifiers, and commonly used alcohol and glycol derivatives. It is also moderately soluble in water.

Packaging Information

Product	Physical Form	Pkg Type	Net Wgt	Pkg Type	Net Wgt
Fungitrol 440S	Liquid	Drum	204.1 kg	275 gal IBC	1,134 kg

Product Safety Information

For health and safety data and handling, storage and disposal procedures, please refer to the Safety Data Sheet (SDS) and product label.

Registration

The active ingredient in Fungitrol 440S fungicide is listed on TSCA, EINECS, DSL, KECI and MITI. Iodopropynyl butylcarbamate is on the official RAL List in Germany.

Regulatory requirements governing the use, registration, and approval of industrial biocides around the world are continually changing and evolving.

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