

KATHON™ 287 PXE Microbicide for Silicone Sealants

Description

KATHON 287 PXE Microbicide has been specifically designed to meet the requirements for use in acetoxy silicone sealants. The active ingredient, 4,5-dichloro-2-n-octyl-4-isothiazolin-3-one (DCOIT), shows excellent efficacy against fungi and bacteria including *Aspergillus*, *Alternaria* and *Candida* species. Due to the very low solubility of DCOIT, the leaching from silicone sealants is minimal, and long term protection is provided.

Features

- Broad spectrum protection (fungal, algal and bacterial)
- Practically insoluble in water, providing long term protection
- Does not interfere with the acid curing process
- Provided in a compatible low volatility carrier
- Cost effective performance
- Compatible with a broad range of acetoxy cured silicones
- Does not yellow or cause other adverse effects
- Does not contain or release formaldehyde
- Does not contain metals or arsenic compounds
- Is not carcinogenic, mutagenic or teratogenic
- Contains active ingredient that won US EPA's Green Chemistry Award, non-persistent in environment, readily dissipated by biological and chemical means
- Easy to incorporate liquid formulation

Typical Physical Properties

These properties are typical but do not constitute specifications.

Appearance	Colorless to amber solution
Odor	Mild
Active ingredient (AI) Concentration	25%
Carrier	Phenyl-1-(3,4-dimethylphenyl)ethane
Specific gravity @ 20°C	0.98

Antimicrobial Activity

The high level of antimicrobial activity of KATHON 287 PXE against a number of fungi, bacteria and algae is indicated by the Minimum Inhibitory Concentrations (MIC) in the table below.

The MIC is the concentration of microbicide that inhibits the growth of the designated microorganism in test tube culture. The data are intended to indicate the activity of KATHON 287 PXE in nutrient media and do not represent a claim for recommended use concentrations.

The MIC values illustrate the broad spectrum efficacy of KATHON 287 PXE which, in combination with low water solubility, is essential to the maintenance of long term protection from fungal and bacterial growth (and discoloration). In particular, this is true for those sealants used in moist or humid conditions which favor microbial growth and where a water soluble biocide would quickly leach away.

Test Organism	ATCC N°	MIC in ppm for Product as Supplied
		KATHON 287 PXE ^a
Fungi		
<i>Aspergillus niger</i>	6278	30
<i>Aureobasidium pullulans</i>	12536	17
<i>Penicillium purpurogenum</i>	52447	0.3
<i>Cladosporium cladosporoides</i>	16022	3
<i>Trichoderma viride</i>	9645	8
<i>Ulocladium atrum</i>	52426	2
<i>Candida albicans</i>	11651	17
Bacteria		
<i>Bacillus subtilis</i>		8
<i>Escherichia coli</i>	11229	53
<i>Pseudomonas aeruginosa</i>	15442	43
<i>Pseudomonas cepacia</i>		8
<i>Staphylococcus aureus</i>	6538	13

Test Organism	N° UTEX ^b	MIC in ppm for Product as Supplied
		KATHON 287 PXE ^a
Algae		
Green Algae		
<i>Chlorella pyrenoidosa</i>	1230	0.2
<i>Chlorococcum oleofaciens</i>	105	3.3
<i>Scenedesmus quadricauda</i>	614	4.2
<i>Ulothrix acuminata</i>	739	2.0
Blue Green Algae		
<i>Anabaena flos-aquae</i>	1444	1.0
<i>Microcystis aeruginosa</i>	2063	2.0
<i>Nostoc commune</i>	584	2.0
<i>Oscillatoria prolifera</i>	1270	1.0
<i>Scytonema hofmanni</i>	2349	2.0
<i>Synechococcus leopoliensis</i>	625	2.0

^a MIC for product as supplied via two-fold both serial dilution tests.

^b Obtained from the Culture Collection at the University of Texas.

Performance Testing and Evaluation

KATHON 287 PXE Fungicide has been evaluated in a range of silicone sealants. The examples given below illustrate the stability and microbicidal activity of the product in this application.

Stability

The active ingredients of KATHON 287 PXE were analyzed in a typical silicone sealant formulation.

Isothiazolone content was analyzed via HPLC. Stability was checked over time by taking aliquots of the sample under investigation and analyzing after varying time intervals. As can be seen from the results in Table 1, KATHON 287 PXE demonstrates excellent stability over time and a broad temperature range.

Table 1
HPLC Analysis of KATHON 287 PXE Fungicide in a Silicone Sealant
% Active Ingredient Remaining

Temperature °C	Time (weeks)		
	0	3	6
25°C	100	100	100
40°C	100	100	100

Efficacy

One of the recognized techniques for determining the efficacy of fungicides in protecting sealants from fungal growth is the ISO 846 test, which is similar to ASTM G-21-96.

The sealant specimen is exposed to spores of specified fungi that are distributed on a complete nutritive medium, which permits their growth. Even if the sealant does not supply any nutrients, the fungi can grow over the sample, and their secreted metabolic products attack the substrate. An inhibition of this growth shows a good fungistatic activity of the treated sealant.

Results

Table 2 below indicates fungal growth of sealants rated on a scale from 0 to 5 where 0 represents no fungal growth, and 5 represents heavy fungal growth.

Table 2
KATHON 287 PXE Microbicide and Protection of Silicone Sealants from Fungal Growth*

Product Tested	Untreated Blank	450 ppm Active of KATHON 287 PXE	500 ppm Active of KATHON 287 PXE	600 ppm Active of KATHON 287 PXE	1000 ppm Active of KATHON 287 PXE
Sealant A unleached	3	NA	0	NA	0
Sealant A leached	1	NA	1	NA	0
Sealant B leached	1	0.0	NA	NA	NA
Sealant C leached	2	NA	NA	0	NA

*Samples tested by ISO test method 846 which is similar to ASTM G-21-96.

Surface fungal growth is rated by the following scale:

Intensity	Evaluation
0	No growth apparent under the microscope
1	No growth visible to the naked eye, covering up to 25% of the test surface
2	Growth is visible to the naked eye, covering up to 25% of the test surface
3	Growth is visible to the naked eye, covering up to 50% of the test surface
4	Considerable growth covering more than 50% of the test surface
5	Heavy growth covering the entire test surface

Organisms Used in the Test: Names	Reference
<i>Aspergillus niger</i>	IMI 91855
<i>Aspergillus terreus</i>	IMI 45543
<i>Penicillium funiculosum</i>	IMI 104624
<i>Trichoderma viride</i>	IMI 296458
<i>Aureobasidium pullulans</i>	IMI 145194
<i>Paecilomyces variotti</i>	IMI 17457
<i>Chaetomium globosum</i>	Rohm and Haas EL*
<i>Gliocladium virens</i>	IMI 45553**

*Sealants A and C only

**Sealant B only

Storage Stability

Storage stability (as a function of time and temperature) is excellent.

Tests have shown that the active ingredient of KATHON 287 PXE does not degrade even after protracted storage at elevated temperature (>12 months at 55°C). Normal recommended storage temperatures are in the range of 10 to 25°C.

Compatibility

KATHON 287 PXE has been found to have good compatibility with the following materials, which may be used for piping, tank linings, fittings and instruments in contact with KATHON 287 PXE.

Fluorinated high density polyethylene
Fiberglass reinforced vinyl ester resin (Derakane 470^a)
PTFE-lined steel
Glass-lined steel
Polyethylene terephthalate (PET)
Teflon^b

^a Derakane is a trademark of Dow Chemical Co.

^b Teflon is a trademark of E.I. DuPont de Nemours & Co.

KATHON 287 PXE should not come in contact with low density polyethylene, since it can cause softening. KATHON 287 PXE is corrosive to uncoated mild and stainless steel and consequently should not come into contact with tanks or pipes of these materials.

Handling and Storage

KATHON 287 PXE can easily be incorporated into the sealant at the compounding stage. Due to the biocidal nature of the product, protective clothing is to be worn while handling the product. Any handling or use that could create aerosols is to be avoided.

Further details are listed in the Material Safety Data Sheets.

Packaging Information

KATHON 287 PXE is available in totes (1000 kg net), drums (200 kg net) and pails (25 kg).

The information presented in this bulletin is intended to help you to evaluate KATHON 287 PXE. For further information or technical assistance, please contact your Rohm and Haas sales representative.

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