

KYDEX® Sheet with Microban® Antimicrobial Protection

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Introduction

KYDEX® sheet is available with the option of Microban® protection — an additive that continuously fights the growth and spread of microbes such as odor and stain causing bacteria, mold and mildew. KYDEX, LLC is the only thermoplastic sheet manufacturer licensed to offer Microban® protection for use in:

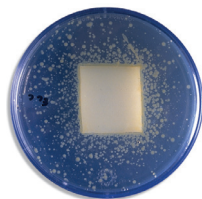
- Airline interior components
- Healthcare furniture
- Protective wall coverings
- Medical device enclosures

General Information

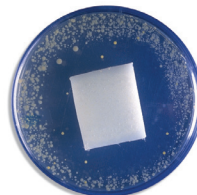
What is Microban Antimicrobial Product Protection?

Microban protection is an additive that contains active ingredients which are incorporated into the polymer structure when KYDEX® sheet is manufactured. There is no single, generic Microban additive. There are over twenty different additives to choose from depending on the material being treated. The Microban Company experts recommended the additive Triclosan to treat the KYDEX® sheet material. Triclosan is an organic antimicrobial with a broad efficacy spectrum. The Microban additive is homogeneously distributed throughout the matrix, enabling it to provide antimicrobial protection across the entire surface area and into the substrate. When microbes come in contact with a KYDEX® sheet that contains Microban, the ingredient penetrates the cell wall, affecting the cell's ability to function, grow and reproduce. The active ingredient is durable, lasting as long as the KYDEX® sheet.

The Microban anti-microbial product in KYDEX® sheet is not OBPA (arsenic) or TBT (Tributyl tin) based. It is an organic based Triclosan product that proves to be the most effective, and safe, product for KYDEX® sheet that will last for the life of the finished part. Triclosan has a 30 year safety record and is proven as one of the most effective and safe antimicrobials on the market. Triclosan is commonly found in toothpaste, hand soaps and many other household products.



Without Microban antimicrobial product protection



With Microban antimicrobial product protection

These samples were tested for efficacy against bacteria using the Kirby Bauer test method. Both samples were inoculated with bacteria and then photographed after 24 hours. The sample on the right was manufactured with Microban protection and the sample on the left was untreated. The sample with built-in Microban protection showed no growth. The untreated sample showed significant contamination.



How Does Antimicrobial Protection Work?

Microban Triclosan is a broad spectrum bacteriostatic and fungistatic additive. As a halogenated bisphenol it affects the metabolic and biochemical processes of bacteria, mold and yeast. The active ingredient has been clinically documented to be effective against a non-comprehensive list of organisms. A sample of the Minimum Inhibitory Concentration (MIC) against selected microorganisms is shown on page two. These values are typical MIC number and may vary in actual use applications.

KYDEX, LLC
ISO 9001 and 14001 Certified

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**Minimum
Inhibitory
Concentration
(MIC)**

Gram Negative

| | |
|--------------------------------|-------------|
| Achromobacter sp. | 3.0 mg/ml |
| Brucella suis | 0.03 mg/ml |
| Escherichia coli | 0.3 mg/ml |
| Escherichia freundii | <100 mg/ml |
| Haemophilus influenzae | 33.0 mg/ml |
| Klebsiella aerogenes | 0.3 mg/ml |
| Klebsiella edwardsii | 0.3 mg/ml |
| Klebsiella pneumoniae | 0.3 mg/ml |
| Moraxella duplex | 0.01 mg/ml |
| Moraxella glucidolytica | 0.3 mg/ml |
| Moraxella lwoffii | 0.1 mg/ml |
| Neisseria catarrhalis | 330. mg/ml |
| Pasteurella pseudotuberculosis | 10.0 mg/ml |
| Pasteurella septica | 0.1 mg/ml |
| Proteus mirabilis | 0.3 mg/ml |
| Proteus morgani | 10.0 mg/ml |
| Proteus rettgeri | 33 mg/ml |
| Proteus vulgaris | 0.1 mg/ml |
| Pseudomona aeruginosa | >1000 mg/ml |
| Pseudomonas fluorescens | >100 mg/ml |
| Salmonella paratyphi | 0.3 mg/ml |
| Salmonella pullorum | 0.3 mg/ml |
| Salmonella typhi | 0.3 mg/ml |
| Salmonella typhimurium | 0.3 mg/ml |
| Serratia marcescens | >100 mg/ml |
| Shigella dysenteriae | 0.1 mg/ml |
| Shigella flexneri | 0.3 mg/ml |
| Vibrio cholerae | 10 mg/ml |
| Vibrio eltor | 10 mg/ml |

Gram Positive

| | |
|--|------------|
| Actinomyces naeslundii | 1.0 mg/ml |
| Bacillus subtilis | 0.1 mg/ml |
| Clostridium difficile | 5.0 mg/ml |
| Corynebacterium acnes | 3.0 mg/ml |
| Corynebacterium diphtheriae | 3.0 mg/ml |
| Dermatophilus congolensis | 1.0 mg/ml |
| Enterococcus faecalis (vancomycin resistant) | 10 mg/ml |
| Ersipelothrix rhusiopathiae | 3.0 mg/ml |
| Lactobacillus sp. | 33.0 mg/ml |
| Listeria monocytogenes | 3.0 mg/ml |
| Micrococcus lysodeikticus | 3.0 mg/ml |
| Micromonospora chalybeata | 0.1 mg/ml |

| | |
|---|------------|
| Mycobacterium smegmatis | 1.0 mg/ml |
| Mycobacterium tuberculosis | 100 mg/ml |
| Mycoplasma hominis | 1000 mg/ml |
| Mycoplasma orale | 1000 mg/ml |
| Nocardia asteroides | 1.0 mg/ml |
| Sarcina lutea | 3.0 mg/ml |
| Staphylococcus aureus | 0.01 mg/ml |
| Staphylococcus aureus (methicillin resistant) | 0.6 mg/ml |
| Staphylococcus epidermidis | 0.05 mg/ml |
| Streptococcus faecalis | 3.0 mg/ml |
| Streptococcus pyogenes | 3.0 mg/ml |
| Streptomyces coelicolor | 3.0 mg/ml |

Fungus & Yeast

| | |
|---------------------------|------------|
| Aspergillus fumigatus | 10 mg/ml |
| Aspergillus niger | 30 mg/ml |
| Blastomyces dermatitidis | 3 mg/ml |
| Candida albicans | 3-33 mg/ml |
| Candida brumptii | 10 mg/ml |
| Candida dattila | 10 mg/ml |
| Candida famata | 10 mg/ml |
| Candida guilliermondii | 33 mg/ml |
| Candida parakrusei | 3 mg/ml |
| Candida parapsilosis | 33 mg/ml |
| Candida pulcherrima | 33 mg/ml |
| Candida stellatoidea | 10 mg/ml |
| Candida tropicalis | 10 mg/ml |
| Candida utilis | 33 mg/ml |
| Cryptococcus neoformans | 10 mg/ml |
| Epidermophyton floccosum | 10 mg/ml |
| Hansenula anomala | 10 mg/ml |
| Keratinomyces ajelloi | 10 mg/ml |
| Microsporium canis | 1-1 mg/ml |
| Microsporium cookei | 33 mg/ml |
| Microsporium gypseum | 10 mg/ml |
| Microsporium nanum | 10 mg/ml |
| Neurospora sitophyllia | 0.1 mg/ml |
| Penicillium egyptiacum | 33 mg/ml |
| Pichia Farinosa | 33 mg/ml |
| Shigella sonnei | 0.1 mg/ml |
| Schizosaccharomyces pombe | 3 mg/ml |
| Sporotrichum schenckii | 3-10 mg/ml |
| Trichophyton concentricum | 10 mg/ml |



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General Information (cont.)

Why is Antimicrobial Protection Important?

In the healthcare and airline industries, preventing the growth and spread of microbes—including odor and stain causing bacteria and fungi—is particularly important. Antimicrobial protection is a distinct benefit in areas where cleanliness matters.

What does this mean to you and your customers?

Increased awareness of the need to manage microbes has made the Microban name widely recognized and sought after. KYDEX® sheet with Microban slows the growth and spread of these microbes, making it easier for your customers to keep your products cleaner between cleanings for the useful life of the product. By using KYDEX® sheet products that contain Microban (designated by the letters MB), you provide a distinct advantage to your customers. No other thermoplastic sheet provider can offer you the Microban advantage in the airline interiors or healthcare industries.

Product Rights

KYDEX has exclusive global product rights to thermoplastic sheet that is *thermoformed, flat laminated and membrane pressed*.

KYDEX has the rights to pass on the Microban brand to your customers in *airlines, healthcare equipment enclosures and protective wall coverings*.



Microban International

Microban is the world's leading provider of safe, durable and effective built-in antimicrobial solutions with locations in:

N. AMERICA

Charlotte, NC USA
Montreal, ON Canada

S. AMERICA

Sao Paulo, Brazil

EUROPE

Milton Keynes, U.K.
Frankfurt, Germany

ASIA

Bangkok, Thailand

The Advantage

Get the KYDEX® MB advantage. Ask your KYDEX sales representative about the following KYDEX® sheet products that include Microban antimicrobial product protection:

- KYDEX® T MB for healthcare components and thermoformed parts
- KYDEX® XD MB for membrane-pressed components
- KYDEX® 150 MB for protective wall coverings, acoustical partitions and pre-laminated panels
- KYDEX® 5555 MB for airline interior components
- KYDEX® FST with Microban® protection for aircraft interior components - specifically formulated to meet all Boeing and Airbus toxicity requirements for aircraft interior components



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This information supersedes all previously published data.