



THE AEGIS MICROBE SHIELD AFTERCARE SYSTEM

APPLICATION MANUAL



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THE ÆGIS MICROBE SHIELD™ AFTERCARE PROGRAM APPLICATION MANUAL

I **Introduction and General Overview**

Welcome to the ÆGIS Microbe Shield Aftercare Program! This manual is a supplement to the field training provided as part of the Program. Its purpose is to provide you with the basic information and reference materials necessary to use the Program effectively. To do so, you need to understand a little bit about the nature of microbial contamination, you need to understand what the ÆGIS Microbe Shield Aftercare Program is (and is not), and you need to understand when it should be used. Finally, you also need to understand the capabilities and limitations of the antimicrobial (ÆGIS Antimicrobial) which is the keystone of the Program.

Important Legal Note

Any material which claims to kill, destroy, control, inhibit, or otherwise eliminate or mitigate "pests" is by definition a pesticide and must be properly registered with the Environmental Protection Agency and state regulatory agencies. Mold, mildew, fungi, bacteria and yeasts are included in the definition of pests. Use of an unregistered pesticide can subject the user to both criminal and civil penalties. Despite the fact that most suppliers avoid the use of the term pesticide, all antimicrobials, disinfectants, sanitizers, bactericides, fungicides, and several other categories of materials are legally pesticides. In addition to product registration, some states require applicators to be licensed for pesticide application. It is your responsibility to understand and comply with your state's licensing and use regulations and requirements.

The Ultimate Goal

The principal goal of the ÆGIS Microbe Shield is to minimize the chances that current or future microbial growth in the indoor environment (i.e., buildings) will damage the building or its contents or will have negative effects on the people who live or work there. By "microbial growth" or "microbes," we mean a vast range of microscopic size organisms (typically single cell organisms) which are referred to by a number of technical and popular names — fungus, bacteria, mold, mildew, yeast, germs, etc.

Microbes

Many microbes are beneficial or, at worst, neutral to humans and animals, but some common fungi and bacteria are truly dangerous. When they are present in large numbers in a building, they can cause allergic reactions, disease, and even death. Some microbes (particularly fungi) cause severe physical damage to building materials, furnishings, and other building contents. They also cause bad odors, staining and ugly growth. Not everyone is equally sensitive to the problems caused by microbes, but infants, the elderly, people with allergies, asthma and respiratory problems, and those with depressed immune systems are in danger.

Common Sense and Lawsuits

It is simple logic that if you can reduce the number of dangerous or destructive microbes in a building, there will be less physical deterioration, less staining, reduced odors, and fewer microbially related human ailments. The first three results are visible, measurable and easy to prove, but the last is not! There is no way to guarantee that reducing microbial contamination in a building will improve the health of the occupants. Our experience with the ÆGIS Microbe Shield technology over more than 15 years and in literally thousands of contaminated buildings is that comprehensive, proper treatment results in a general reduction in the human health symptoms which are associated with microbes, but there will always be exceptions. In today's lawsuit happy environment, any company that claims it can eliminate health problems with any process or treatment has a death wish. It also happens to be illegal under the Federal Insecticide Fungicide and Rodenticide Act to make health claims for the use of any pesticide — and, like it or not, antimicrobials, sanitizers and disinfectants are considered to be pesticides by the EPA.

Microbes — What? and Why?

Microbes are present in every building. There is nothing wrong with that. Even potentially dangerous fungi and bacteria are common in our homes and work places. (*Stachybotrys chartarum*, *Aspergillus versicolor*, *Legionella*, and *E. coli* are some that have made recent sensational headlines.)

Some highly sensitive individuals react to very low levels of the toxins produced by these organisms, but most people only react when some building condition

allows one or more microbes to multiply rapidly. To live and multiply, microbes need three things: something to eat (food), moisture, and a reasonable temperature. The building materials, furnishings and objects in our homes and buildings provide the food. The temperature and humidity which are comfortable to people are also comfortable for microbes. The basic needs are present in almost every building. Problems arise when one or more of these is out of balance. Water leaks, sweating walls, high humidity, high temperatures, and food spills can cause rapid, massive growth with resulting physical damage and human health problems.

Remedies

When a problem has developed, only two things can happen. It gets worse, or it can be controlled (total elimination of microbial contamination is a myth). The traditional remedy is disinfection. Many materials are effective at killing microbes. Chlorine bleach is one of the best. Unfortunately, many of the best disinfectants are dangerous themselves and neither have (nor are intended to have) any lasting effect. As soon as the disinfectant is gone, the microbes start growing again. If the leaks, high humidity, high temperature or unsanitary conditions have not been corrected, the original problem can be back in a day or two.

The ÆGIS Microbe Shield is a Program, not a Chemical!

The ÆGIS Microbe Shield is unique for three reasons. First, it provides you, the Certified Applicator, with the basic knowledge to understand the nature and causes of microbial contamination; second, it gives you access to outstanding technical support, consulting services and microbiological lab services; and third, it utilizes a proprietary antimicrobial treatment which not only kills microbes effectively, but also prevents future growth on treated surfaces. The antimicrobial is odorless, colorless, EPA registered and accepted for treatment of all indoor non-food contact surfaces, easily applied in a water solution, cost-effective, and has a history of more than 20 years of safe use in the treatment of products ranging from socks to medical soft goods and in homes, schools, hospitals, offices and manufacturing facilities.

A Bit of History and a New Approach

Over the years of its use, the antimicrobial which is the keystone of the ÆGIS Microbe Shield Program has had several names. It was invented by Dow Corning

Corporation and, for building treatment use, was sold under the name "SYLGARD® Antimicrobial Treatment." Dow Corning's SYLGARD® Program was discontinued at the end of 1989. ÆGIS Environments acquired exclusive marketing and use rights to the antimicrobial in 1990 and began developing the ÆGIS Microbe Shield Aftercare Program. The antimicrobial agent was renamed "ÆGIS™ Antimicrobial." Until the introduction of the ÆGIS Microbe Shield Aftercare Program in 1997, ÆGIS Environmental Management, Inc. tightly restricted availability of the antimicrobial agent, and only ÆGIS and a small number of its close affiliates used the material in the indoor environmental quality market.

In 1997, a new approach was developed and launched. The ÆGIS Microbe Shield Aftercare Program and its unique antimicrobial agent are now available to established service organizations which are willing to make a serious commitment in training, proper equipment, quality assurance, and ethical marketing.

Realistic Expectations

Both you and your customers need to have realistic expectations of what can and cannot be accomplished with the ÆGIS Microbe Shield Aftercare Program. It is also critical that you and your customers understand that treatment with the antimicrobial is only part of the job. Treatment with the antimicrobial will kill existing microbes on treated surfaces and will minimize regrowth on the treated surfaces for an extended period of time, but it can't and won't correct structural or mechanical problems. A truly successful project requires both the ÆGIS Microbe Shield Aftercare Program and elimination of the building conditions which caused the contamination in the first place. The statement about killing existing microbes and minimizing regrowth needs to be qualified. The antimicrobial has extraordinary capabilities, but it isn't a cure-all. It is unlikely that it will completely destroy a quarter inch thick layer of mold. It is not a cleaner. If you treat a wall with visible mold, the mold will be dead, but it will still be ugly. Also, it will not magically restore damaged surfaces or substrates. Water-soaked wallboard or rotten wood need to be replaced, and any surface that requires treatment should be clean.

How Long Will it Last?

The question of effective life is very difficult to answer. One of the things which makes the antimicrobial unique and effective is its chemical nature. When it is applied in a water solution, the active ingredient quickly reacts with the surface to form a totally new surface. Technically the new surface is called a co-polymer. It is not a coating like paint. It is an integral and permanent part of the surface. Because of its antimicrobial nature, existing microbes on the treated surface are killed and any new microbes which contact the treated surface cannot grow. The treatment does not dissipate over time. It does not volatilize (give off gasses or chemicals into the air), it is insoluble (it won't wash off), and it doesn't leach (move through other materials by any one of a number of physical processes). Also, it is not absorbed or consumed (eaten) by the microbes. The result is that the antimicrobial surface does not lose its antimicrobial activity over time. In theory, it should last forever. In practice it does not.

For the antimicrobial to be effective, it must come into direct contact with the microbes. If application is not complete and uniform, microbes will grow on untreated areas. If something covers the antimicrobial surface and prevents contact, microbes will grow on the covering material. A new coat of paint or a soap film will make the treatment ineffective. (If the soap film is removed, the antimicrobial will work again.) The antimicrobial surface is very thin and it can be worn away. Heavy foot traffic on a concrete or tile floor can remove the antimicrobial surface. Normal cleaning will not affect the treatment, but heavy scrubbing with abrasive cleaners will remove some of it. Finally, on some soft materials, treatment will only be effective until the surface is disturbed. An example would be the dirt floor of a crawl space.

So what is the answer to the durability question? There isn't a good one. It depends on you and the risk you are willing to take. On projects which we do ourselves, ÆGIS typically warrants that our treatment will remain effective on typical interior surfaces for a minimum of 3 years and on HVAC components for 1 year. We have had few complaints and nothing that would be classified as a failure. We have numerous applications which are still very effective after 7-10 years. But, you need to recognize that people equate odors with mold and often can't differentiate between dirt and mold on a wall. You will get calls and you will need to respond. The expectation you create in your customer and how you respond is up to you.

Conclusion

With this as a general background, the balance of this manual deals with the mechanics of using the ÆGIS Microbe Shield Aftercare Program and its antimicrobial agent. The initial section provides the basics of treatment technique. There are sections on treating different kinds of surfaces, equipment needs, safety, and general trouble shooting, and there is an Appendix with additional materials which we hope will be helpful.

II APPLICATION

A. Overview

This section describes the general procedures which need to be followed for a successful application. The key is to provide a **uniform** application of the antimicrobial to the target surfaces. For the antimicrobial to be most effective, it must be **applied uniformly to prepared surfaces** in accordance with the instructions provided in the training program and this section of the manual.

B. When and What Not to Treat

The first question that always needs to be asked is when and what not to treat. Building materials which have lost their structural integrity cannot be saved. After floods, some materials are better discarded and replaced. This is always a value judgment, but because of the cost and difficulty of removing, drying, cleaning, treating and then reinstalling carpet padding and old carpets, it often makes sense to replace these items. On the other hand, high quality carpeting which is still in good shape can be saved, although it is probably a good idea to replace the padding. Some other surfaces or items should not be treated because the water which is part of the treatment solution would destroy them. For example, some designer fabrics are destroyed by water. Other items have natural dyes which will bleed. Most paper will be damaged. If you have any doubt whatsoever about the effect that treatment will have on a surface, spot check the surface by applying the antimicrobial solution in an inconspicuous area to test color fastness and other physical effects. **If you are unsure about the possible effects after spot checking, it is best not to treat.**

C. Clean vs. Dirty Surfaces

Clean is always better! The antimicrobial will attach itself to virtually any surface and add its antimicrobial properties, **but it is not a cleaner**. If you treat dirty surfaces, the end product may be antimicrobial on a dirty and ugly surface. When the surface is finally cleaned, most of the antimicrobial will be removed along with the dirt. The ideal surface is one which has been cleaned recently and well rinsed to remove any residual detergents, or one which is fresh from the factory.

Some manufacturing processes leave residual soiling in the form of lint or lubricants. In reality most surfaces, including recently cleaned ones, will have

some level of soiling. The antimicrobial molecule will attach to any surface it contacts. Heavy soiling tends to bind up the treatment and prevent treatment of the target surface. Dirty surfaces on ceilings and walls are more likely to drip or run and show streaking. Treated dirt in a carpet will be removed the next time the carpet is cleaned professionally. The Commercial Pre-treatment Guidelines in the Appendix provide a good overview of site preparation and cleaning requirements.

Pre-job Inspection

A dirty surface definitely shortens the effective life of the treatment and this should be considered in any warranty which you provide. A thorough pre-job inspection is strongly recommended so that you will know what you are getting into. Make a sketch of the areas to be treated and note any pre-existing problems such as soiling, staining, deterioration, damaged or missing surfaces. When possible, obtain permission to photograph or video tape the general condition of the facility and specific problems in the area to be treated. If you get into a dispute with a customer, good background documentation will be invaluable.

D. Recommended Crew Size

For each technician who is spraying, there should be a minimum of one assistant to wipe down overspray and buff bright surfaces. Assistants should also help with draping, moving furniture, placing anti-stain pads, and monitoring drying operations.

E. Coverage, Mixing and Shelf Life

READ AND UNDERSTAND ALL SAFETY PRECAUTIONS PRIOR TO HANDLING CONCENTRATE.

NOTE: To avoid contamination, use only dedicated equipment for measuring, mixing and applying the antimicrobial agent.

1. Typical Coverage Rates: (square feet of surface per gallon of solution)

Measure/estimate the area to be treated and calculate the amount of solution to mix. The following table gives general guidelines, but you will need to develop your own standards. Actual coverage can vary dramatically because of porosity of surfaces, existing moisture content, spray nozzle selection, and spray technique.

Carpet Type	Coverage per Gallon of Solution
Tight-Loop Commercial & Kitchen	300-400 sq.ft.
Plush & Shag	200-300 sq.ft.*
Hard Surfaces	500-1500 sq.ft.**

* Varies with density and height of tufts

** Varies with surface porosity

2. Dilution Rate and Batch Quantity

Dilute the concentrate at the rate of 2 1/2 oz. per gallon of water solution. (See "Water Quality" below.) Triple rinse the measuring container after using. Mix only enough solution to be used in 48 hours.

Note: Foaming will occur if water is allowed to splash during addition. To avoid foaming, add half of the calculated amount of water to the tank, then stir in the antimicrobial concentrate, immediately followed by adding the rest of the water in a way that avoids splashing.

3. Water Quality

As a general rule, it is not necessary to use distilled water for mixing application strength solution. Room temperature or slightly warm tap water is preferred. Hot water can cause the antimicrobial to separate from the water. Ideally, the water should have a slightly acidic to neutral pH of 5.5 to 8.0. (Adjust pH of solution with citric acid as necessary.) Water which is alkaline or has a hardness level greater than 400 ppm will cause the active ingredient in the antimicrobial to form flakes and come out of solution. Solutions which appear milky or which have a solid precipitate (little white pieces) should be neutralized and disposed of properly. See Environmental section of manual.(Section VII-E).

4. Shelf Life of Application Strength Solutions

Mix only enough solution to use during a 48-hour period. Working life of application strength solutions tends to vary greatly depending on pH, hardness of water and storage conditions. Ideal storage temperature is 65° to 76°F. Storage of application strength solution and unflushed hoses in high temperature areas (vehicles, storage sheds, warehouses, etc.) will result in the solutions starting to polymerize and form gels and particulates. Any solutions which have started to gel or develop particles, or which have

a milky appearance, should be neutralized and disposed of properly. See Environmental Section VII-E.

F. Spray Application

No matter what kind of surface is being treated, the objective is to wet it uniformly so that the active ingredient in the application solution can react with every portion of the surface. With some surfaces, this is a challenge. Hard, smooth surfaces tend to bead water and it may be necessary to wipe the surfaces with a solution-wetted rag immediately after spraying. In some situations it may be necessary to mix a special application solution with a surfactant. Contact ÆGIS for recommendations on compatible surfactants. Carpeting (especially deep pile carpeting) requires special care to assure that the treatment penetrates to the base of the fibers.

Estimate the area to be treated and mix the appropriate amount of antimicrobial solution.

Hold the spray nozzle 24" from the surface and apply in even strokes using a 1/3 overlap.

Immediately after spraying, place pads under all furniture legs to prevent staining of the carpet.

Wipe and dry all bright surfaces such as glass and chrome **IMMEDIATELY** after treatment to prevent water spotting.

Use a carpet rake to help work in the antimicrobial and groom as necessary.

Set out air movers (fans) to speed the drying process.

G. Other Application Methods for Special Circumstances

(See Section V. "Surfaces")

H. Drying

The antimicrobial treatment will dry at normal room temperatures, but the longer that surfaces remain wet, the more chance there is for some of the treated surfaces to be soiled or damaged by the water. Whenever possible, the drying process should be accelerated.

As the antimicrobial treatment goes through its bonding process, a temporary tackiness may be evident as the treatment dries. The tackiness will disappear when completely dried.

1. Equipment & Methods

Air movers or fans are recommended to help shorten drying time. Other things which may be of help are:

- a.) Set the HVAC System fan control to manual and run the fan continuously.
- b.) Adjust the exhaust and outside air settings to their maximum safe settings. (High relative humidity or extreme cold may not permit maximum settings.)
- c.) Raise the thermostat a few degrees to allow the circulated air to hold more moisture for the same % relative humidity.
- d.) Depending on outside relative humidity, open windows to bring in drier outside air and help lower overall humidity levels.
- e.) Use dehumidifiers or desiccation units to lower overall humidity levels.
- f.) Treated surfaces should be dried to or slightly below their natural moisture- regain levels. Checks with moisture meters made before and after treatment may be helpful.

2. Re-entry time

The major concern for area access control is that freshly applied antimicrobial causes hard surfaces to become extremely slippery. In addition, any soil on shoes or equipment will stick to surfaces during the tacky phase of their drying process.

Hard surfaces are frequently dry within 1-2 hours. Most carpet and fabric surfaces are dry to the touch after 6-8 hours. Humidity and air movement conditions in the treated space will control the length of time necessary to completely dry the treatment. If you over-treat, drying time will be lengthened.

III **Spray Equipment & Accessories**

A. Equipment Selection

An airless power sprayer capable of maintaining a sustained minimum output pressure of 90-100 psi is strongly recommended. It will allow you to provide a uniform treatment with a minimum of dripping. This is especially important on walls and hard surfaces. Carpets can be treated with lower pressure sprayers (40 psi), but a 90-100 psi unit will improve penetration of the treatment to the base of the material.

Connections should be of a drip-less hydraulic style such as the Parker BH2-60 series.

Spray wands should have a quality valve handle such as the TeeJet® models 31 or 6466, 18 or 24-inch curved extension, a combination strainer with an integral ball check valve, and spray nozzle. The check valve reduces dripping from spray wands.

B. Spray Nozzles

To provide the most uniform and efficient application, we strongly recommend using different spray tips for different kinds of surfaces. Based on our experience, we have found the nozzles listed below to provide good application capabilities.

The recommended nozzles produce a flat-fan shaped pattern or a hollow-cone shaped pattern. Flat-fan patterns are recommended for the majority of applications. The hollow-cone pattern nozzle is useful in applying low volume mists to hard, smooth surfaces (painted walls) where water spotting and runs are more likely to occur. In using the flat-fan pattern nozzles, the applicator should select a nozzle that allows for a steady work pace while maintaining a uniform application. The higher volume nozzles are used for more absorbent surfaces, such as carpets, and the lower volume nozzles for hard and low absorbency surfaces such as concrete or block walls.

C. Flat-Fan Spray Pattern — TeeJet® and Lurmark® Nozzles

Lurmark®	TeeJet®	Pattern & Rate	Typical Use
02F80YE	8002	80° with 0.32 gpm at 100 psi	carpet
01F80OR	8001	80° with 0.16 gpm at 100 psi	porous hard surfaces, above ceilings
005F65	80005	65°/80° with 0.08 gpm at 100 psi	semi-porous hard surfaces & above ceilings

D. Hollow-Cone Spray Pattern — TeeJet® and Lurmark® Nozzles

Lurmark®	TeeJet®	Pattern & Rate	Typical Use
HCX2		80° with 0.052 gpm at 100 psi	non-porous hard surfaces

E. Carpet Rakes

Carpet rakes greatly assist penetration of the antimicrobial agent to the base of carpet tufts for maximum protection. They should be used during initial treatment to facilitate wetting and as the final step to restore loft. All cut loop carpets should be raked. Carpet rakes are unnecessary on short, tight-loop kitchen and commercial carpet.

F. Furniture Pads

Since carpets are wetted during treatment, rust and stains from furniture legs can occur. Pads (foam block, foil or polyethylene) should be placed under furniture legs when they are moved back into normal position. Pads are available from janitorial supply houses.

G. Drop Cloths

Any furniture or equipment which might be damaged by moisture should be removed or covered with drop cloths. Plastic drop cloths provide good protection, but are very slippery. In general, cloth is a better and safer alternative.

IV Order of Treatment

A. Preparation

Confirm that all necessary equipment and supplies are loaded and ready to operate.

B. Site Arrival

On arrival at the project site, the project leader should confirm the following items with the owner or owner's representative:

- Determine loading dock or building entrance to be used.
- Determine equipment staging/storage area to be used.

C. Documents

- Obtain a building floor plan map (A fire escape map works well).
- Complete Safety Check List — Emergency Phone Numbers, Contact People, Exits, Phone Locations.
- Maintain records of areas treated and amount of chemical used. (See Appendix — "Sample Spray Report").

D. Site Survey

Always perform a site survey before treating. Make sure that the owner or a representative accompanies you.

Note the following items:

- A. Furniture that will need protective carpet pads and items to cover with drop cloths.
- Doors which require keys to open.
 - Elevator availability for equipment movement.
 - HVAC controls and access points.
 - Areas requiring special procedures (clean rooms, kitchens, high ceilings).

If there are add-ons or changes, get a signed Change Order.

E. Safety Check and Treatment Plan

Review any safety items and the treatment plan with the crew.

F. Equipment Check

Confirm that all necessary equipment is on site and ready to operate.

G. Order of Procedure

As a general rule, treat from high to low. This minimizes the chance of creating unsightly streaking.

1. Treat Above Ceiling Space

2. Treat Ceilings

3. Treat Walls

4. Treat Special Surfaces

5. Treat Flooring

6. Quality Check

- a). Confirm that all areas to be treated have been completed.
- b.) Note any changes to the approved plan.
- c). Make sure overspray and drips have been wiped up.
- d). Make sure surfaces are drying as expected.
- e). Relocate furniture that has been moved.
- f). Pick up drop cloths and wipes.
- g). Clean up and pack equipment (drain & flush hoses & spray wands).
- h). Repeat Quality Check and perform clean-up inspection.

V Surfaces

This section describes in greater detail the methods that should be used to provide a uniform application of the antimicrobial agent to different types of target surfaces. For the ÆGIS Microbe Shield Program to be fully effective, the antimicrobial **must be applied uniformly to prepared surfaces**.

A. Soft Surfaces

1. Carpet

As in all applications of the antimicrobial, the purpose is to bond it to the surface where protection from microbial growth is required. Carpet provides a three dimensional surface that needs treatment in order to install an effective shield. Each yarn of carpet is composed of hundreds of individual fibers attached to the backing with adhesives. The base of the fibers and backing are where the majority of the nutrients for fungi are found.

In treating any surface, the technician must use his or her judgment in applying sufficient solution to adequately wet the surfaces. Overtreatment can cause problems! Overtreatment may cause lessened efficacy, may create a sticky surface, increases drying time, and is a waste of money.

If spills occur, you should immediately stop spraying and use towels or other absorbent materials to blot up the excess solution.

The antimicrobial may be applied to dry or damp carpets.

Damp carpets will require less treatment solution. The existing moisture helps to wick the antimicrobial to the base of the tufts and backing.

a). Pretreatment

Dry, cut-loop carpets (i.e., plushes and shags) should be lightly misted and, if necessary, groomed with a carpet rake to help break the surface tension of the antimicrobial solution prior to the full treatment. This pretreatment will help start the wicking action necessary for denser carpets. If the ceilings of a room are treated immediately before the carpeting, the fallout mist is usually enough to start the wicking action on exposed carpet. Carpet under furniture will still require pretreatment.

b). Pile Types and Considerations:

Tight Loop Commercial — Grooming is recommended for high traffic areas.

Berbers — Groom as carpet texture permits.

Cut Loop Carpets — Groom as required to break surface tension of treatment and restore loft.

Persian and Native American Rugs — **CAUTION:** Persian and Native American Rugs normally use natural dyes. Many natural dyes are water soluble and will run if they get wet. In general, do not treat anything with natural dyes. If you are **very experienced** in treating techniques and if the customer fully understands that some damage may occur, items with natural dyes can be treated lightly. ***Never treat items with natural dyes without first doing spot tests (checks) in inconspicuous areas.***

2. Other Fabric Surfaces

CAUTION: Cotton, wool, synthetics and most blends can be treated successfully and without damage, but silk, satin, and some designer fabrics may be damaged or destroyed. ALWAYS spot check fabric surfaces in inconspicuous areas for color fastness, spotting and other problems. Fabrics like silk will be damaged by water spotting. If unsure about the possible effects, the best policy is not to treat.

- a). Draperies and Upholstery:** Treat by lightly misting. Make certain that draperies are adequately supported and will not hang unevenly (shrink or stretch) as a result of the treatment. Also draperies frequently are designer fabrics.
- b). Upholstered Furniture:** Treat all accessible surfaces. Cushions should be propped up to allow for improved air circulation while drying. Physically beating the upholstery helps to maximize the penetration of the treatment.
- c). Silk Flowers and Plants —** Treat by using a quick pass with a hard-surface nozzle approximately 24 inches from the surfaces.
- d). Paintings and Artwork —** In general, paintings and artwork problems should be handled by an artwork restoration specialist. You cannot afford

to destroy or damage a valuable piece of artwork! It is generally safe to treat the back of paintings to protect the back surface, BUT, proceed with care.

- e). **Room Dividers** — Soft room dividers should be treated lightly by misting. Brushing may be required to restore the loft of carpet style coverings.

3. Food Contact Surfaces

DO NOT TREAT FOOD CONTACT SURFACES WITH THE ANTIMICROBIAL.

It is not approved for this use by the EPA. Whether or not it works and whether or not you consider it safe are irrelevant. Examples of "food contact surfaces" are kitchen counters and sinks, and cutting boards. Other kitchen surfaces and food processing areas (back-splashes, soffits, beneath sinks, behind appliances, etc.) may be treated.

4. Hard Surfaces

General Considerations

The objective is always to wet the surface completely so that the active ingredient can react with the surface, without causing runs or drips. Different kinds of surfaces require slightly different application techniques to achieve the best treatment.

Many hard surfaces in buildings should be thought of as "systems," rather than simple surfaces. For example, the wallpaper that a client wants treated is probably just the visible part of a wall system that includes wallpaper, paste, sizing, wallboard, insulation, sheathing, and siding or brick. Treating a surface problem without understanding the system and the sources of moisture, food and fungal contamination leads to unrealistic expectations of control.

Set up the spray wand for hard-surface applications. Use a high-pressure pump system (100 psi) for improved control of mist droplet size.

Soiled surfaces tend to drip and streak. They must either be cleaned before treatment or wiped thoroughly as a part of the treatment.

On porous surfaces (cement, unfinished paneling or wood, unglazed ceramic tile, ceiling tiles, bulletin boards, etc.), apply mist in a crossing pattern (i.e., treat the entire surface lightly while moving the spray wand back and forth in one direction and then treat a second time while moving the wand in a direction 90° to that used for the first application.)

Over-application promotes surface condensation in cool and damp areas. The surface condensation then becomes a trap and growth point for fungi.

Drips and runs cause streaks and spots. They **must** be wiped with a cloth or sponge moistened in the antimicrobial solution. Moisten the wipe by spraying. Do not dip the wipe into the solution tank as dirt and lint cause some precipitation of the active ingredient.

Wear safety goggles to keep spray out of eyes.

When spraying overhead, wear long-sleeved shirts and hair protection (such as a painters cap). Every chemical, no matter how safe it is, has the possibility of causing problems. It's better to be safe than sorry. Build-up on hair leaves a waxy feel.

a). Wallpaper

Check for loose seams, paste on the surface, sub-surface staining, and “popcorning” (rough grainy texture caused by growth under paper). Re-glue loose seams, remove excess paste and replace severely deteriorated material prior to treatment.

Vinyl paper acts as a vapor barrier and may be preventing moisture movement from the wall cavity into the occupied space of the room. Sub-surface growth is a common occurrence with non-breathing wall papers. Remember, only microorganisms contacting the treated surface will be controlled by the antimicrobial.

Textured wall papers may support active fungal colonies in the body of the paper or in the paste.

b). Plaster Walls

Confirm the integrity of the wall before treating. (This is especially important when there are signs or a history of water damage.) Clean surfaces of growth. Use bleach or peroxide solutions to remove staining. Apply the antimicrobial to the surfaces. Wipe surfaces with a soft cloth or squeegee to assure complete contact, and avoid water spotting.

c). Ceiling Tiles

If at all possible, have the owner fix all water leaks and replace water or mildew stained tiles before treating. The antimicrobial agent used in the *ÆGIS* Microbe Shield Aftercare Program is a surface treatment and generally does not control sub-surface growth. Consider the style and how the tiles are installed. Depending on air movement designs and flow patterns, both the face and back of each tile may need to be treated.

d). Wood

Carefully examine contaminated surfaces for surface growth vs. wood rot. Wood rot is internal and generally will require replacement of the rotted section. The *ÆGIS* Microbe Shield treatment will have little effect on internal wood rot. Determine whether or not the surface has been or can be sealed. Raw wood surfaces are difficult to treat and the results tend to be less satisfactory. Clean surfaces of growth. Use bleach or peroxide solutions to remove staining. Apply the antimicrobial to the surfaces. Wipe surfaces with a soft cloth or squeegee to assure complete coverage and to avoid water spotting. The antimicrobial is a surface treatment and generally does not control sub-surface growth.

e). Concrete Floors

Determine if the surface has microbial growth or is efflorescing due to water migration. Water migration through the concrete must be stopped in order to assure any long-term control. Clean surfaces of growth. Use bleach or peroxide solutions to remove staining. Apply sufficient antimicrobial to cover the surfaces. Excess application promotes surface condensation in cool and damp areas. The surface condensation then becomes a trap and growth point for fungi. Sealed surfaces will not require as much treatment as porous surfaces.

f). Tile & Terrazzo

Warning: Tile and terrazzo can be very slippery while still wet with the antimicrobial treatment. Surfaces should be wiped dry as soon as possible after treatment.

These surfaces are not typically a source of microbial contamination due to frequent cleaning.

The antimicrobial will frequently cause a slight hazing of the tile surface. This hazing will clear when the floor is buffed. Stripping or aggressive buffing may remove the treatment.

g). Above Ceiling Surfaces

In buildings with dropped ceilings, the above ceiling space may or may not play an important role in microbial contamination in the occupied space. Many buildings use the above ceiling space as an open-return air plenum for the HVAC system. Where this is the case, microbial growth in the above ceiling area can be picked up by the air flow and disseminated throughout the building. In buildings with fully ducted returns, the above ceiling space tends to be dead air and there is less chance for the contamination to be spread through the occupied space.

The typical target surfaces are the bottom of the deck (roof or floor) usually 4-6 feet above the suspended ceiling, and the accumulated dust on the ductwork, pipes and top of the suspended ceiling tiles.

- 1). What To Expect:** Congested to very open, heavy dust, water staining or mildew staining. Additional problems such as insects or rodents should be brought to the owner's attention. Wood or other cellulosic materials are often contamination sources.
- 2). What Kind of Access:** Dependent upon congestion, you usually will need access every 10 feet and will need to work off of a step ladder. Obey organizational and OSHA safety rules for working on ladders.
- 3). Treatment:** Above ceiling spaces are notoriously dusty and are almost impossible to clean. Generally there is little alternative but to treat without cleaning. Because of the dirt and the porous nature of

many ceiling tiles, it is necessary to be especially careful to avoid overwetting the surfaces. The combination of dirt, water and porous tiles is ideal for causing unsightly stains.

h). High Surfaces:

Current methods of application include use of extension poles or air-assisted atomization. CAUTION: Overspray is a problem with both of these methods — plan on using cloth drop cloths or wiping up many surfaces. Protect all fish tanks from exposure.

i). HVAC Systems/ Ductwork

The preferred procedure for applying the antimicrobial agent to ductwork is by spraying directly on all surfaces. Inaccessible areas may be treated by using the fogging techniques described below. Some states require that any firm working on a ventilation system hold a contractor's license for HVAC work. Check your state's requirements prior to accepting work involving treatment of ductwork.

- 1). Confirm with the building manager that the HVAC system will be shut down during the entire treatment
- 2). Locate the electrical breaker that supplies the power to the HVAC system and use appropriate lockout and tagging procedures indicating the date, time and location within the building where you will be working on the HVAC system. Also extinguish any open flames such as pilot lights.
- 3). Perform any required HVAC system cleaning work in accordance with current NADCA (North American Duct Cleaners Association) protocols. Surfaces to be cleaned should include all intake and outlet vents, including vent diffusers. Remove all vent covers prior to treatment.
- 4). Mix application strength solution and fill the fogger's chemical compartment.
- 5). Turn on the fogger. Fog from the return air intakes toward the blower. (See manufacturer's instructions.)

- 6). Fog from the blower section towards the distribution diffusers.
Design features such as VAV controls, mixing boxes and turning vanes will require additional access sites for proper treatment.
- 7). Reinstall all vent covers. Remove the lockout and tagging on the electrical box and switch the electrical breaker to "ON." Relight any extinguished pilot lights.

j). Bright Surfaces & Glass

Bright surfaces and glass usually do not support microbial growth and do not need to be treated, but the antimicrobial is very effective on these surfaces. They must be treated carefully to get uniform coverage. Treated surfaces should be dried and buffed immediately to avoid water spotting.

VI Special Considerations and Trouble Shooting

A. Injection

In some cases, it may be desirable to use injection to treat hard-to-reach places such as baseboards or carpet padding.

An appropriately sized hypodermic needle should be filled with an aqueous solution of the antimicrobial having a concentration equal to that used for treatment of damp carpeting. Enough of the solution should be injected into the baseboard or padding to completely wet the problem area.

B. Secondary Blooms

Occasionally the applicator and property owner/manager will notice an increase in mildew odor after the antimicrobial agent is applied. This odor is the result of the rapid growth and destruction of the fungi and spores that were not removed prior to application of the antimicrobial. This process may cycle several times over the next 2 weeks as subsequent organisms germinate and then are destroyed by the bonded antimicrobial. Some relief may be obtained by maximizing the amount of fresh-air intake and maximizing exhaust of interior air. Additional relief may be obtained by use of activated carbon filters in the air handler. Use of masking perfumes is not recommended. They may make it difficult to identify any residual trouble spots and many individuals are sensitive to chemicals.

C. Wall Cavities

In severely contaminated buildings, it is not uncommon for the inside of the wall cavities to have microbial growth on the surfaces. There is no easy or cheap way to treat these surfaces. If they must be treated, about the only way to do it is to remove large sections of wallboard or cut many access holes.

In most cases, treatment is not necessary. Even though the wall cavities contain contamination, there is seldom enough air movement from the cavities to the occupied space to transfer the contamination. It may be a better strategy to try to isolate the wall cavities from the occupied space.

Permanently flexible silicone sealant can be used to fill any small openings, and gaskets can be used around outlets.

D. Flooding

Flooding can result from broken pipes, roof leaks, sewage backups or natural disasters. Minor pipe and roof leaks should be repaired, the water removed, and drying started immediately. Treatment of the affected surfaces and surrounding areas should proceed as soon as the water has been removed. Larger floods and natural disasters usually will need specialized cleaning and drying as part of the recovery plan. A specialized drying contractor should be consulted regarding the ability to quickly dry and save structural components and special surfaces.

Substrates, such as drywall, that have lost their structural integrity should be removed and discarded.

Portions of the structure and furnishings that were not flooded but are experiencing high relative humidity should be treated as soon as possible as part of preventive measures to minimize microbial contamination.

Surfaces and furnishings that have been saved by cleaning should be treated as soon as possible to assist in destroying any remaining microorganisms and minimize the chances of recontamination.

Carpets should be cleaned of debris, lifted and dried from both the back and front. Carpet pads are typically very difficult to dry and should be discarded. Carpets should be treated on both the front and back as soon as excess moisture has been removed and the drying process started.

Areas that have been exposed to demolition should have all debris removed, surfaces cleaned, and the antimicrobial agent applied as soon as possible.

VII Safety and Handling

A. Product Information

	CONCENTRATE	DILUTED WORKING SOLUTION
Composition:	3 (trimethoxy)silylpropyldimethyl-octadecyl ammonium chloride diluted to 42% active ingredients by weight with methanol	1.0 or 2.0% by weight of the concentrate in water
Appearance:	Clear to dark amber liquid	Clear to yellow tint
Stability: Thermal Freeze/Thaw	Active ingredient stable to 257°F (125°C) Stable through 10 cycles. If frozen, thaw first and mix well before use. Do not expose to open flame or spark	The solution is stable to 212°F (100°C) at STP. If solution has frozen, thaw and then agitate ¹ .
Flash point ²	54°F (12.2°C)± 5°F (2.7°C) (closed cup)	126°F (60.2°C)± 5°F (2.7°C) (closed cup), greater than 212°F (100°C) (open cup)
Hazard Classification	Flammable liquid due to methanol	Not flammable

1 If thawed product is cloudy, it normally can be recovered by warming to 120°F (49°C) or until clear. If cloudiness persists, follow disposal instructions or contact your technical representative.

2 The temperature at which ignition will occur provided that a source of ignition and an adequate oxygen level are present.

B. Storage

	CONCENTRATE	DILUTED WORKING SOLUTION
Flammability:	Flammable	Not Flammable
Moisture Sensitivity:	Moisture Sensitive. Keep closed until use.	Not Moisture Sensitive
Shelf Life:	12 months in closed container.	Up to 6 months in closed containers with no water evaporation or external contaminants. Before use of previously mixed solution, always check for flakes, cloudiness, or gelling. ^{1,2}
Recommended Storage Temp:	Ambient. ^{3,4}	Ambient ³
Extinguishing:	Carbon dioxide or foam.	Not flammable.

1 If flakes or cloudiness are present, the solution can normally be recovered by warming to 120°F (49°C) or until clear. If cloudiness persists or gelling is present, follow disposal instructions or contact your technical representative.

2 Shelf life can be maximized by maintaining the pH between 4.5 and 6.5 and a hardness less than 400 ppm.

3 If product has frozen, thaw and then agitate well. **OBSERVE ALL SAFETY PRECAUTIONS. DO NOT PLACE NEAR IGNITION SOURCE OR OPEN FLAME!**

4 The methanol carrier from the concentrated antimicrobial causes significant pressure build-up in the container at temperatures above 100°F (37.78°C). Therefore, the container should be opened slowly to relieve any pressure build-up.

C. Shipping

1. Concentrate

When the antimicrobial agent is shipped as a concentrate by ÆGIS, it is properly marked, labeled, and packaged for surface transportation. The carton, marks, and labels can be reused if they are in good condition. The Department of Transportation (D.O.T.) regulations (Title 49 of Federal Regulations) stipulate that during transport of the concentrated antimicrobial material, as with any flammable liquid, the following procedures must be followed:

- a). The cap of the polyethylene flex spout must be closed tightly.
- b). The flex spout should be collapsed into the pail lid until flush.

During transportation of the antimicrobial, a proper bill of lading must accompany the product. An example of such a document is on the following page. Professional applicators must have this document available in their vehicles, even when transporting the antimicrobial agent concentrate from job to job.

2. Dilute Aqueous Working Solution

D.O.T. regulations do not apply to the dilute working solution.

Straight Bill of Lading

From: _____

To: _____

IN CASE OF TRANSPORTATION EMERGENCY CALL _____

Date Shipped: ___/___/___

Number	Kind	Weight	HM	Description of Materials, Special Marks & Exceptions
1	pail	35 lbs.	X	Methanol Solution, 3, UN 1230, II

The above information is all that is required for an applicator (private carrier) to transport the concentrated ÆGIS Antimicrobial from job to job. In addition to the above information, the certificate statement and signature are required for all shipments not by private carrier. Individuals offering hazardous materials for transport are by law required to have their training updated every 2 years.

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation, according to the applicable regulations of The Department of Transportation.

_____: **Shipper**

_____: **Per Agent**

_____: **Driver's Signature**

D. Handling

	CONCENTRATE	EMERGENCY FIRST AID	DILUTED WORKING SOLUTION
Skin Contact:	Can cause irritation. Wear solvent resistant gloves.	Flush exposed area with water	No effect on skin. ¹
Eye Contact:	Severe effect on eyes, can cause blindness. Wear eye protection to prevent contact with eyes.	Flush eyes with water for 15 minutes. Obtain medical help.	Slight irritation. Poses no hazard from incidental contact. ¹
Inhalation:	Prolonged or repeated exposure to undiluted material may have an intoxicating effect. Provide adequate ventilation	Remove to fresh air.	No effect.
Ingestion:	Poses no hazard from ingestion incidental to commercial handling. Large doses can cause blindness or be fatal.	If swallowed, obtain medical attention.	Poses no hazard from ingestion incidental to commercial handling.
Labeling:	Proper labeling has been provided by ÆGIS Environments.		All working solutions must be properly labeled per applicable regulations.

¹ Always wear standard plant safety apparel and protective devices when handling chemicals.

E. Environmental

<p>Chemical Spill:</p>	<p>Cover or protect drains from possible spills when handling the antimicrobial. If a spill of the concentrate occurs, soak up the liquid with an absorbent material such as sawdust, rags, or an industrial absorbent. Allow to air dry, then send to an approved landfill or incinerate</p>
<p>Inactivation and Disposal:</p>	<p>Both the dilute and concentrated material can be inactivated by adding an anionic surfactant such as most powdered laundry detergents (like TIDE). Neutralization of the active ingredient is complete when the solution has turned milky white or a solid precipitate has formed. The inactivated solution can then be processed through a municipal waste treatment system or absorbed, dried and disposed of as above.</p>
<p>Disposal of Containers:</p>	<p>Review all applicable regulations concerning health and pollution to determine approved disposal procedures. Empty containers should be flushed with water, rinsed three times, and destroyed by perforating or crushing. The containers can then be buried in an approved landfill. Do not cut or weld on any container.</p> <p>Do not reuse empty containers.</p>

VIII Appendix

EPA INFORMATION**Overview**

This section contains information regarding oversight which the United States Environmental Protection Agency (EPA) has over chemical treatments such as the *ÆGIS* Antimicrobial. This section also contains information about the product chemistry and a specimen label that appears on the container of concentrated product along with the supporting technical bulletin.

In addition to the chemical and physical information presented, there are regulatory requirements as well. Our regulatory agency, the EPA, governs all aspects of the use of *ÆGIS* Antimicrobial. The EPA was created to coordinate government environmental action. The Agency is responsible for administering and enforcing laws legislated by Congress. This includes the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which also regulates *ÆGIS* Antimicrobial. This act requires that before any product can be legally offered for sale, or be manufactured, the manufacturer must submit and have approved a wealth of toxicological and environmental impact data supporting the product in question.

ÆGIS Antimicrobial is registered with both the EPA and state environmental protection agencies (EPA Registration No. 64881-3) as a surface treatment. When used as directed, it poses no environmental hazard. All claims, labeling and use instructions have been reviewed and accepted by the EPA. Detailed toxicological and environmental data worth over 2 million dollars have proven that this material is safe to man and the environment when used as directed on the label.

At the time of printing the registration for the use of *ÆGIS* Antimicrobial covers:

Carpet, draperies and upholstery.

Interior non-food contact hard surfaces including: floors, walls, ceilings, ceramic tile, concrete, chrome stainless steel, fiberglass, vinyl, porcelain, paper wall covering, wood and glass fixtures, marble, aluminum, air filters, book covers, pictures and furniture.

- 1). The surfaces covered in the "interior non-food contact hard surfaces" are standard components of heating, ventilation and air conditioning systems, permitting the use of *ÆGIS* Antimicrobial in treating HVAC systems.

Specimen Label

AEGIS™ Antimicrobial

A SILANE QUATERNARY AMMONIUM SALT

EPA Reg. No. 64881-3

EPA Est. 34292-MI-01

ACTIVE INGREDIENT: 3-(trimethoxysilyl) propyldimethyloctadecyl ammonium chloride 42%
INERT INGREDIENTS: 58%

CONTAINS OVER 49% METHANOL

KEEP OUT OF REACH OF CHILDREN

DANGER!  **POISON** 
CAUSES EYE DAMAGE

- METHANOL MAY CAUSE BLINDNESS • HARMFUL OR FATAL IF SWALLOWED • VAPOR HARMFUL • AVOID BREATHING SPRAY MIST OR VAPORS • AVOID CONTACT WITH SKIN • FLAMMABLE

STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED: Drink large quantity of water. Have patient lie down and keep warm. Cover eyes to exclude light, call a physician and/or poison control center. IF INHALED: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. IF ON SKIN: Flush with copious amounts of water for at least 15 minutes. IF IN EYES: Flush with copious amounts of water for at least 15 minutes and get immediate medical attention.

PRECAUTIONARY STATEMENTS

HAZARD TO HUMANS (& DOMESTIC ANIMALS)

DANGER! CORROSIVE. CAUSES EYE DAMAGE AND SKIN IRRITATION.

Keep out of reach of children. Do not get in eyes, on skin, or on clothing. Wear goggles or face shield and rubber gloves when handling. Use with adequate ventilation. Vapor harmful. Avoid breathing of vapor. Harmful or fatal if swallowed. Avoid contamination of food. Methanol may cause blindness.

ENVIRONMENTAL HAZARDS:

This pesticide is toxic to aquatic organisms. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

PHYSICAL OR CHEMICAL HAZARDS

Flammable. Keep away from heat and open flame.

AEGIS™ Antimicrobial

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its label.

FOR COMMERCIAL USE ONLY, AS A FINAL BACTERIOSTATIC, FUNGISTATIC, PRESERVATIVE FINISH IN THE PRESENCE OF MOISTURE

AEGIS Antimicrobial is to be used only as directed in AEGIS' Technical Bulletins

STORAGE AND DISPOSAL

STORAGE: Moisture sensitive. Keep tightly closed until ready to use. Reclose tightly after each use.

DISPOSAL: Do not contaminate water, food or feed by storage or disposal. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Do not reuse containers. Do not cut or weld containers. Triple rinse (or equivalent) empty containers. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

NOTICE: AEGIS warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated in the bulletin when used in accordance with directions under normal conditions of use; but this warranty of fitness for a particular purpose does not extend to the use of this product contrary to bulletin instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use. **AEGIS ENVIRONMENTAL MANAGEMENT, INC. SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING THE WARRANTY OF MERCHANTABILITY.**

ATTENTION! This container will have vapor and/or product residues when emptied. All hazard precautions on label must be observed when handling emptied container.



**METHANOL SOLUTION
UN1230**



Sold by:

**AEGIS ENVIRONMENTAL
MANAGEMENT, INC.**

3106 SWEDE AVENUE
MIDLAND, MICHIGAN 48642
989-832-8180, U.S.A.

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MADE IN U.S.A.

SPECIMEN LABEL 2214628

DATE CODE 0198

2214628 PRINTED IN U.S.A. IN JANUARY 1998 REPLACES SPECIMEN LABEL 2214628 PRINTED IN SEPTEMBER 1995. DISCARD PREVIOUS SPECIMEN LABELS. REVISIONS INCLUDE: PRODUCT NAME CHANGE, REGISTRATION NUMBER, SELLER NAME AND ADDRESS.

ÆGIS MICROBE SHIELD™ PROGRAM

TECHNICAL BULLETIN

DESCRIPTION

ÆGIS™ Antimicrobial is 3-(trimethoxysilyl) propyldimethyloctadecyl ammonium chloride containing 42 percent active ingredient by weight in methanol.

FEATURES

Good durability — ÆGIS Antimicrobial imparts durable, broad spectrum antimicrobial activity to the surface of a wide variety of substrates; is leach-resistant and non-migrating and is not consumed by microorganisms

Broad-spectrum activity — effective against gram(+) and gram(-) bacteria, fungi, algae and yeasts; antimicrobial action is exhibited on contact in the presence of moisture

Increased efficiency — through proper application, durable bacteriostatic, fungistatic and algistatic surfaces can be attained with a minimum amount of ÆGIS Antimicrobial

BENEFITS

Provides preservation for many types of fibers, fabrics, threads and surfaces against a wide variety of bacteria, fungi, yeasts and algae

Prevents deterioration and discoloration caused by bacteria, fungi, algae and yeasts

Retains the "freshness" of an article by inhibiting or resisting the growth of odor-causing bacteria and mildew (fungus)

Prolongs life of an article by inhibiting the growth of bacteria and mildew

Provides hygienic freshness

Provides a treatment that is not destroyed by cleaning/washing

Resists odors through chemical protection

Compatible with substrates and processes listed under approved uses

ÆGIS™ ANTIMICROBIAL

U.S. Environmental Protection Agency Registration Number 64881-3 (EPA Est. 34292-MI-01)
Type Silane quaternary ammonium salt
Physical Form Low-viscosity liquid
Special Properties Surface bondability
Primary Uses As a surface-durable antimicrobial agent that is active against a wide variety of bacteria, fungi, algae and yeasts

APPROVED USES

- Carpet, draperies and upholstery
- Interior non-food contact hard surfaces including: floors, walls, ceilings, ceramic tile, concrete, chrome, stainless steel, fiberglass, vinyl, porcelain, paper wall covering, wood and glass fixtures, marble, aluminum, book covers, pictures and furniture

HOW TO USE

ÆGIS Antimicrobial can be applied to organic and inorganic surfaces as a dilute aqueous solution to give 0.1 to 1.0 percent by weight of active ingredients. Aqueous solutions can be prepared by simply adding the antimicrobial agent to water with stirring.

Surfaces can be treated with the aqueous solution by dipping, padding or spraying until adequately wet, or applying by foaming techniques.

After applying treatment, the surface should be allowed to dry. Open windows and use a fan or other active means of ventilation to remove the methanol vapors from the room.

STORAGE, HANDLING AND PRECAUTIONARY INFORMATION

This product is "flammable" and "poisonous." Keep away from heat and open flame.

Storage and Shelf Life

When stored in original, unopened containers at or below 25 C (77F), ÆGIS Antimicrobial has a minimum shelf life of 12 months from date of

shipment. Since this material is moisture-sensitive, keep containers tightly closed after each use.

Handling (Danger)

Wear goggles or face shield and rubber gloves when handling the concentrated material.

ÆGIS Antimicrobial, if ingested in amounts incidental to industrial handling, should pose no significant adverse health hazard. Direct contact of the undiluted material with eyes may cause serious injury or blindness. Particular care must be taken to prevent eye contact. In case of contact with eyes, immediately flush eyes with large amounts of water for at least 15 minutes and get prompt medical attention.

Single, short-term skin exposure to concentrate may cause slight irritation. Contact over several days may cause blistering and a superficial burn. Precautions should be taken to avoid prolonged or repeated skin contact.

Undiluted ÆGIS Antimicrobial contains 50 percent methanol. Keep away from heat and open flame. Appropriate measures should be taken to prevent the accumulation of hazardous concentrations of methanol vapors in the work area. Avoid breathing vapors.

Neutralization and Environmental Protection

ÆGIS Antimicrobial is toxic to aquatic

organisms. This antimicrobial agent, by standard BOD (biological oxygen demand) and TOD (total oxygen demand) determination, does not appear to be biodegradable. Potential harm to the environment is minimized, however, because of the minimal amount of chemical applied and its durable coupling to surfaces.

Inactivation of solutions containing ÆGIS Antimicrobial may be accomplished by addition of an anionic surfactant or detergent in quantity equivalent to that of ÆGIS Antimicrobial in solution.

Every effort should be made to contain accidental spills of concentrate to the immediate area. This may be accomplished by the use of sandbags or barrier material to confine the spill to facilitate cleanup and disposal. Contaminated sand or barrier material may then be disposed of by burial in an approved landfill. Many spills may be cleaned up with rags or other absorbent materials by wiping, soaking and/or mopping and allowing the liquid to absorb onto the material.

The absorbent material may then be disposed of by incineration or landfill.

Floor drains in areas of material use should be protected with absorbent material or barrier material to contain accidental spills.

MSDS INFORMATION

BEFORE HANDLING, READ PRODUCT AND MATERIAL SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE MATERIAL SAFETY DATA SHEET CAN BE OBTAINED BY WRITING TO ÆGIS ENVIRONMENTS OR BY CALLING (517) 832-8180. A MATERIAL SAFETY DATA SHEET FOR A TYPICAL USE DILUTION AQUEOUS SOLUTION IS ALSO AVAILABLE.

Shipping Limitations

DOT Classification: Flammable.

Packaging

ÆGIS Antimicrobial is supplied in 35-,

and 380-lb (15.9- and 181.4-kg) containers, net weight.

IMPORTANT: WARRANTY AND DISCLAIMER INFORMATION

ÆGIS Environmental Management, Inc. warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated in this bulletin when used in accordance with directions under normal conditions of use; but this warranty of fitness for a particular purpose does not extend to the use of this product contrary to bulletin instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use.

ÆGIS ENVIRONMENTAL MANAGEMENT, INC. SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING THE WARRANTY OF MERCHANTABILITY.

ÆGIS ENVIRONMENTS

3106 Swede Avenue
Midland, Michigan 48642-3843
989-832-8180

Protected by The



ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

ÆGIS Microbe Shield™ Program – ÆGIS Antimicrobial (42% Active Concentrate, As Manufactured)

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION											
ÆGIS Environments 3106 Swede Avenue Midland, MI 48642-3843	Telephone: (989) 832-8180 Fax: (989) 832-7572										
MSDS No. 64881-3 Current Version: 7/26/00											
<table style="width: 100%; border: none;"> <tr> <td style="padding-right: 10px;">Generic Description:</td> <td>Organosilane solution</td> </tr> <tr> <td>Physical Form:</td> <td>Liquid</td> </tr> <tr> <td>Color:</td> <td>Colorless to pale yellow</td> </tr> <tr> <td>Odor:</td> <td>Solvent odor</td> </tr> <tr> <td>NFPA Profile:</td> <td>Health 2 Flam mability 3 Reactivity 0</td> </tr> </table>		Generic Description:	Organosilane solution	Physical Form:	Liquid	Color:	Colorless to pale yellow	Odor:	Solvent odor	NFPA Profile:	Health 2 Flam mability 3 Reactivity 0
Generic Description:	Organosilane solution										
Physical Form:	Liquid										
Color:	Colorless to pale yellow										
Odor:	Solvent odor										
NFPA Profile:	Health 2 Flam mability 3 Reactivity 0										
Note: NFPA: National Fire Protection Association											

SECTION 2 – OSHA HAZARDOUS COMPONENTS			
<u>CAS Number</u>	<u>Wt%</u>	<u>Component</u>	<u>Exposure Limits</u>
000067561	50	Methyl alcohol	OSHA PEL (final rule) and ACGIH TLV-skin: TWA 200 ppm; STEL 250 ppm.
027668526	42	Octadecylaminodimethyltrimethoxysilylpropyl ammonium chloride	None established
002530872	8	Chloropropyltrimethoxysilane	Dow Corning guide: TWA 0.1 ppm. Also methyl alcohol comments.
Comments: Methyl alcohol forms on contact with water or humid air. Provide adequate ventilation to control exposures within guidelines of OSHA PEL: TWA 200 ppm and ACGIH TLV-skin: TWA 200 ppm, STEL 250 ppm.			

SECTION 3. EFFECTS OF OVEREXPOSURE	
<u>Acute Effects</u>	
Eye:	May cause irreversible damage and burns to the eyes.
Skin:	May cause moderate irritation
Inhalation:	Vapor and/or mist may irritate nose and throat. Overexposure by inhalation may cause drowsiness, dizziness, confusion or loss of coordination.
Oral:	Overexposure by ingestion may cause effects similar to those listed under repeated exposure.
<u>Prolonged/Repeated Exposure Effects</u>	

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

Skin: Overexposure by skin absorption may injure the following organ(s): Kidneys. Bladder. Repeated or prolonged exposure may irritate seriously

Inhalation: Overexposure by inhalation may injure the following organ(s): Liver. Kidneys. Bladder. Adrenals. Overexposure to vapor may cause blindness and nervous system effects due to methyl alcohol poisoning.

Oral: If swallowed, blindness, even death may result due to methyl alcohol poisoning.

Signs and Symptoms of Overexposure

No known applicable information.

Medical Conditions Aggravated by Exposure

No known applicable information

The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions, component data and/or expert review of the product. Please refer to Section 11 for detailed toxicology information.

SECTION 4. FIRST AID MEASURES

Eye: Immediately flush with water for 15 minutes. Get medical attention.

Skin: Remove from skin and immediately flush with water for 15 minutes. Get medical attention if irritation or ill effects develop or persist.

Inhalation: Remove to fresh air. Get medical attention if ill effects persist

Oral: Get medical attention. If conscious, induce vomiting. Lie down, keep warm, and cover eyes to exclude light.

Comments: Treat same as methyl alcohol poisoning.

SECTION 5. FIRE FIGHTING MEASURES

Flash Point (Closed Cup): 51.98 Degrees F / 11.10 Degrees C

Autoignition Temperature: Not Determined

Extinguishing Media: On large fires use dry chemical, foam or water spray. On small fires use carbon dioxide (CO₂), dry chemical or water spray. Water can be used to cool fire exposed containers.

Fire Fighting Procedures: Self-contained breathing apparatus and protective clothing should be work in fighting large fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan. Use water spray to keep fire exposed containers cool.

Unusual Fire Hazards: Vapors are heavier than air and may travel to a source of ignition and flash back. Static electricity will accumulate and may ignite vapors. Prevent a possible fire hazard by bonding and grounding or inert gas purge.

Hazardous Decomposition Products:

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

Thermal breakdown of this product during fire or very high heat conditions may evolve the following hazardous decomposition products: Carbon oxides and traces of incompletely burned carbon compounds. Nitrogen oxides. Chlorine compounds. Silicon dioxide. Formaldehyde.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Containment/Clean-up: Remove possible ignition sources. Determine whether to evacuate or isolate the area according to your local emergency plan. Observe all personal protection equipment recommendations described in Sections 5 and 8. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbant. Clean area as appropriate since some silicone materials, even in small quantities, may present a slip hazard. Final cleaning may require use of steam, solvents or detergents. Dispose of saturated absorbant or cleaning materials appropriately, since spontaneous heating may occur. Local, state, and federal laws and regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which federal, state and local laws and regulations are applicable. Sections 13 and 15 of this MSDS provide information regarding certain federal and state requirements.

NOTE: See Section 8 for Personal Protective Equipment for Spills. Call AEGIS (517-832-8180), if additional information is required.

SECTION 7. HANDLING AND STORAGE

Use with adequate ventilation. Product evolves methyl alcohol when exposed to water or humid air. Provide ventilation during use to control exposure within Section 2 guidelines or use air-supplied or self-contained breathing apparatus. Do not breath vapor, mist, dust, or fumes. Keep container closed. Do not get in eyes. Do not take internally. Avoid skin contact.

Static electricity will accumulate and may ignite vapors. Prevent a possible fire hazard by bonding and grounding or inert gas purge. Keep container closed and away from heat, sparks and flame. Keep container closed and store away from water or moisture.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls

Local exhaust: Recommended

General ventilation: Recommended

Personal Protective Equipment for Routine Handling

Eyes: Use chemical worker's goggles.

Skin: Wash at mealtime and end of shift. If skin contact occurs, change contaminated clothing as soon as possible and thoroughly flush affected areas with cool water. Chemical protective gloves are recommended.

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MATERIAL SAFETY DATA SHEET

Suitable Gloves:	Silver Shield®. 4H®
Inhalation:	Use respiratory protection unless adequate local exhaust ventilation is provided or air sampling data show exposures are within recommended exposure guidelines. Industrial Hygiene Personnel can assist in judging the adequacy of existing engineering controls.
Suitable Respirator:	Self-contained breathing apparatus (SCBA) or other supplied-air respirator.

Personal Protective Equipment for Spills:

Eye:	Use full face respirator.
Skin:	Wash at mealtime and end of shift. If skin contact occurs, change contaminated clothing as soon as possible and thoroughly flush affected areas with cool water. Chemical protective gloves are recommended.
Inhalation/Suitable Respirator:	Use self-contained breathing apparatus (SCBA) or other supplied-air respirator.
Precautionary Measures:	Do not get in eyes. Avoid skin contact. Do not breathe vapor, mist, dust, or fumes. Keep container closed. Do not take internally.
Comments:	Product evolves methyl alcohol when exposed to water or humid air. Provide ventilation during use to control exposure within Section 2 guidelines or use air-supplied or self-contained breathing apparatus.

Note: These precautions are for room temperature handling. Use at elevated temperature, or aerosol/spray applications, may require added precautions.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical form:	Liquid
Color:	Colorless to pale yellow
Odor:	Solvent odor
Specific Gravity @ 25C:	0.88
Viscosity:	5.00 CST
Freezing/Melting Point:	Not Applicable
Boiling Point::	>35C/95F
Vapor Pressure @ 25C:	Not Determined
Vapor Density:	Not Determined
Solubility in Water:	Not Determined
pH:	Not Applicable
Volatile content:	Not Determined

Note: The above information is not intended for use in preparing product specifications. Contact AEGIS before writing specifications.

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

SECTION 10. STABILITY AND REACTIVITY	
Chemical Stability:	Stable
Hazardous Polymerization:	Hazardous polymerization will not occur.
Conditions to Avoid:	None
Materials to Avoid:	Oxidizing material can cause a reaction. Water, moisture, or humid air can cause hazardous vapors to form as described in Section 2.
Comments:	None

SECTION 11. TOXICOLOGICAL INFORMATION	
<u>ACUTE TOXICOLOGY DATA FOR PRODUCT</u>	
Complete information is not yet available	
<u>COMPONENT TOXICOLOGY INFORMATION</u>	
<p>This product (mixture) has been shown to be non-mutagenic in an extensive battery of genetic assays, it does however, contain a component (chloropropyltrimethoxysilane) which when tested alone, has shown some mutagenic activity. Chloropropyltrimethoxysilane was found to be genetically active via inhalation in a single bone marrow micronucleus assay (female rats exposed to 200 ppm/day for 28 days). In the same assay, no evidence of genetic activity was found in mice exposed to 500, 1000 or 1625 mg/kg by I.P. injection. The potential relevance of this to humans has not yet been determined.</p>	
<u>SPECIAL HAZARD INFORMATION ON COMPONENTS</u>	
<u>Mutagens</u>	
002530872	7-13 Chloropropyltrimethoxysilane Positive in the Ames Test; Genetically Active in IN VIVO assay.

SECTION 12. ECOLOGICAL INFORMATION			
<u>Environmental Fate and Distribution</u>			
No specific information is available.			
<u>Ecotoxicity</u>			
No specific information is available.			
<u>Persistence and Degradation</u>			
No specific information is available.			
Ecotoxicity Classification Criteria			
Hazard Parameters (LC50 or EC50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	≤1	>1 and ≤100	>100
Acute Terrestrial Toxicity (mg/kg)	<-100	>100 and ≤2000	>2000

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

This table is adapted from "Environmental Toxicology and Risk Assessment", ATMA STP 1179, p. 34, 1993.

This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

SECTION 13. DISPOSAL CONSIDERATIONS

RCRA Hazard Class (40 CFR 261)

When a decision is made to discard this material, as received, is it classified as a hazardous waste? Y

Federal Hazardous Waste Code: NA

Characteristic Waste: Ignitable: D001 Corrosive: NA Reactive: NA

TCLP: NA

State or local laws may impose additional regulatory requirements regarding disposal.

NA = Not Applicable

Call AEGIS, (517) 832-8180, if additional information is required.

SECTION 14. TRANSPORT INFORMATION

DOT Road Shipment Information (49 CFR 172.101)

Proper Shipping Name: METHANOL SOLUTION

Hazard Technical Name: NA

Hazard Class: 1

UN / NA Number: UN1230

Packing Group: II

0000 and NA = Not Applicable

Call AEGIS, (517) 832-8180, if additional information is required.

SECTION 15. REGULATORY INFORMATION

Contents of this MSDS comply with the OSHA Hazard Communication Standard 29CFR 1910.1200

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

EPA SARA Title III Chemical Listings:

Section 302 Extremely Hazardous Substances:

None

Section 304 CERCLA Hazardous Substances:

ÆGIS ENVIRONMENTS
MATERIAL SAFETY DATA SHEET

000067561 50 Methyl alcohol

Section 312 Hazard Class:

Acute: Y
Chronic: Y
Fire: Y
Pressure: N
Reactive: N

Y = Yes N = No

Section 313 Toxic Chemicals:

000067561 50 METHYL ALCOHOL

Supplemental State Compliance Information

<u>CAS Number</u>	<u>Wt %</u>	<u>Component</u>
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California

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause cancer.

None Known.

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause birth defects or other reproductive harm.

None Known.

Massachusetts

000067561 50 Methyl alcohol

New Jersey

027668526 42 Octadecylaminodimethyl trimethoxysilylpropyl ammonium chloride

002530872 8 Chloropropyltrimethoxysilane

000067561 50 METHYL ALCOHOL; #1222

Pennsylvania

027668526 42 Octadecylaminodimethyl trimethoxysilylpropyl ammonium chloride

002530872 8 Chloropropyltrimethoxysilane

000067561 50 Methyl alcohol

ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

SECTION 16. OTHER INFORMATION

Prepared by: AEGIS Environments.

These data are offered in good faith as typical values and not as product specifications. No warranty, either express or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determined whether they are appropriate.

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ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

ÆGIS Microbe Shield™ Program – AEGIS™ Antimicrobial (Typical Application Strength)

Note: This Material Safety Data Sheet has been prepared to provide information on the typical application strength material which is used in the treatment of goods or surfaces. ÆGIS Antimicrobial is only sold as a concentrate in methanol and not as a dilute solution. For application ÆGIS Antimicrobial is diluted with water. The hydrolyzed material in the dilute solution then covalently or ionically bonds with the target surface and covalently bonds with itself to form a durable copolymer. Any CAS Numbers shown below are for the “as supplied” form of the antimicrobial. No CAS Numbers have been assigned for the intermediate hydrolyzed form or the resulting copolymer, neither of which are articles of commerce.

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION											
ÆGIS Environments 3106 Swede Avenue Midland, MI 48642-3843	Telephone: (989) 832-8180 Fax: (989) 832-7572										
MSDS No. 64881-3	Current Version: 7/26/00										
<table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">Generic Description:</td> <td>Organosilane in water</td> </tr> <tr> <td>Physical Form:</td> <td>Liquid</td> </tr> <tr> <td>Color:</td> <td>Colorless to pale yellow</td> </tr> <tr> <td>Odor:</td> <td>None</td> </tr> <tr> <td>NFPA Profile:</td> <td>Health 1 Flam mability 0 Reactivity 0</td> </tr> </table>		Generic Description:	Organosilane in water	Physical Form:	Liquid	Color:	Colorless to pale yellow	Odor:	None	NFPA Profile:	Health 1 Flam mability 0 Reactivity 0
Generic Description:	Organosilane in water										
Physical Form:	Liquid										
Color:	Colorless to pale yellow										
Odor:	None										
NFPA Profile:	Health 1 Flam mability 0 Reactivity 0										
Note: NFPA: National Fire Protection Association											

SECTION 2 – OSHA HAZARDOUS COMPONENTS			
<u>CAS Number</u>	<u>Wt%</u>	<u>Component</u>	<u>Exposure Limits</u>
000067561	0.75%	Methyl alcohol	OSHA PEL (final rule) and ACGIH TLV-skin: TWA 200 ppm; STEL 250 ppm.
027668526	0.84%	Octa decylamino dime thyltri hydroxy-silylpropyl ammonium chloride	Observe above limits for methanol formed on exposure to water or humid air.
002530872	0.16%	Chloropropyltri hydroxysilane	Observe above limits for methanol formed on exposure to water or humid air.
7732-18-5	98.25%	Water	None
Comments:	Methyl alcohol forms on contact with water or humid air. Provide adequate ventilation to control exposures within guidelines of OSHA PEL: TWA 200 ppm and ACGIH TLV-skin: TWA 200 ppm, STEL 250 ppm.		

SECTION 3. EFFECTS OF OVEREXPOSURE	
<u>Acute Effects</u>	
Eye:	Direct contact may burn eyes with possible permanent injury.

ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

Skin: No untoward effects.
Inhalation: No untoward effects. Also see comment below
Oral: No untoward effects.

Prolonged/Repeated Exposure Effects

Skin: No untoward effects.
Inhalation: No untoward effects.
Oral: No untoward effects.

Signs and Symptoms of Overexposure

No known applicable information.

Medical Conditions Aggravated by Exposure

No known applicable information

The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions, component data and/or expert review of the product. Please refer to Section 11 for detailed toxicology information.

SECTION 4. FIRST AID MEASURES

Eye: Immediately flush with water for 15 minutes. Get medical attention.
Skin: Get medical attention if irritation or ill effects develop or persist.
Inhalation: Remove to fresh air. Get medical attention if ill effects persist
Oral: Get medical attention if ill effects develop or persist.
Comments: None

SECTION 5. FIRE FIGHTING MEASURES

Flash Point (Closed Cup): None
Autoignition Temperature: Not Applicable
Extinguishing Media: Not Applicable
Fire Fighting Procedures: Not Applicable
Unusual Fire Hazards: None

Hazardous Decomposition Products:

Thermal breakdown of this product during fire or very high heat conditions may evolve the following hazardous decomposition products: Carbon oxides and traces of incompletely burned carbon compounds. Nitrogen oxides. Chlorine compounds. Silicon dioxide. Formaldehyde.

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

SECTION 6. ACCIDENTAL RELEASE MEASURES

Containment/Clean-up: Use absorbent material to collect and contain for salvage or disposal.

SECTION 7. HANDLING AND STORAGE

Storage: Store below 100°F

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls

Local exhaust: Recommended

General ventilation: Recommended

Personal Protective Equipment for Routine Handling

Eyes: Use chemical worker's goggles.

Skin: Wash at mealtime and end of shift. Contaminated clothing and shoes should be cleaned before reuse. Rubber or plastic gloves are recommended.

Inhalation/Suitable Respirator: No special requirements. If methanol STEL is exceeded or predicted, use self contained breathing apparatus (SCBA) or other supplied-air respirator.

Personal Protective Equipment for Spills:

Eye: Use chemical worker goggles.

Skin: Wash at mealtime and end of shift. Contaminated clothing and shoes should be cleaned before reuse. Rubber or plastic gloves are recommended.

Inhalation/Suitable Respirator: No special requirements. If methanol STEL is exceeded or predicted, use self contained breathing apparatus (SCBA) or other supplied-air respirator.

Precautionary Measures: Do not get in eyes. Avoid skin contact. Do not breathe vapor. Do not take internally.

Comments: Product evolves small amounts of methyl alcohol when exposed to water. Provide ventilation during use to control exposure within Section 2 guidelines.

Note: These precautions are for room temperature handling. Use at elevated temperature, or aerosol/spray applications, may require added precautions.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical form:	Liquid
Color:	Colorless to pale yellow
Odor:	None
Specific Gravity @ 25C:	1.00

ÆGIS ENVIRONMENTS
MATERIAL SAFETY DATA SHEET

Viscosity:	5.00 CST
Freezing/Melting Point:	32°F/0°C
Boiling Point::	212°F/100°C
Vapor Pressure @ 25C:	Not Determined
Vapor Density:	Not Determined
Solubility in Water:	Not Applicable
pH:	Not Applicable
Volatile content:	0.75%

Note: The above information is not intended for use in preparing product specifications. Contact AEGIS before writing specifications.

SECTION 10. STABILITY AND REACTIVITY

Chemical Stability:	Stable
Hazardous Polymerization:	Hazardous polymerization will not occur.
Conditions to Avoid:	None
Materials to Avoid:	Oxidizing material can cause a reaction. Anionic materials, i.e. surfactants. Materials that would shift pH to 10.5.
Comments:	None

SECTION 11. TOXICOLOGICAL INFORMATION

ACUTE TOXICOLOGY DATA FOR PRODUCT

Complete information is not yet available

SECTION 12. ECOLOGICAL INFORMATION

Environmental Fate and Distribution

No specific information is available.

Ecotoxicity

No specific information is available.

Persistence and Degradation

No specific information is available.

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

Ecotoxicity Classification Criteria			
Hazard Parameters (LC50 or EC50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	≤1	>1 and ≤100	>100
Acute Terrestrial Toxicity (mg/kg)	<-100	>100 and ≤2000	>2000

This table is adapted from "Environmental Toxicology and Risk Assessment", ATMA STP 1179, p. 34, 1993.

This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

SECTION 13. DISPOSAL CONSIDERATIONS

RCRA Hazard Class (40 CFR 261)

When a decision is made to discard this material, as received, is it classified as a hazardous waste? Y

Federal Hazardous Waste Code: NA

Characteristic Waste: Ignitable: NA Corrosive: NA Reactive: NA TCLP: NA

State or local laws may impose additional regulatory requirements regarding disposal.

NA = Not Applicable

Call AEGIS, (517) 832-8180, if additional information is required.

SECTION 14. TRANSPORT INFORMATION

DOT Road Shipment Information (49 CFR 172.101)

Proper Shipping Name: NA

Hazard Technical Name: NA

Hazard Class: NA

UN / NA Number: NA

Packing Group: NA

0000 and NA = Not Applicable

Call AEGIS, (517) 832-8180, if additional information is required.

ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

SECTION 15. REGULATORY INFORMATION

Contents of this MSDS comply with the OSHA Hazard Communication Standard 29CFR 1910.1200

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

EPA SARA Title III Chemical Listings:

Section 302 Extremely Hazardous Substances:

None

Section 304 CERCLA Hazardous Substances:

000067561 0.75% Methyl alcohol

Section 312 Hazard Class:

Acute: N

Chronic: N

Fire: N

Pressure: N

Reactive: N

Y = Yes N = No

Section 313 Toxic Chemicals:

000067561 0.75% METHYL ALCOHOL

Supplemental State Compliance Information

<u>CAS Number</u>	<u>Wt %</u>	<u>Component</u>
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California

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause cancer.

None Known.

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause birth defects or other reproductive harm.

None Known.

Massachusetts

000067561 0.75% Methyl alcohol

New Jersey

ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

027668526	0.84%	Octadecylaminodimethyl trimethoxysilylpropyl ammonium chloride
002530872	0.16%	Chloropropyltrimethoxysilane
000067561	0.75%	METHYL ALCOHOL; #1222
Pennsylvania		
027668526	0.84%	Octadecylaminodimethyl trimethoxysilylpropyl ammonium chloride
002530872	0.16%	Chloropropyltrimethoxysilane
000067561	0.75%	Methyl alcohol

SECTION 16. OTHER INFORMATION

Prepared by: AEGIS Environments.

These data are offered in good faith as typical values and not as product specifications. No warranty, either express or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determined whether they are appropriate.

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ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

ÆGIS Microbe Shield™ Program – AEGIS™ Antimicrobial (Typical Applied Material)

Note: This Material Safety Data Sheet has been prepared to provide information on the typical material remaining on a surface which has been treated with AEGIS Antimicrobial. AEGIS Antimicrobial is only sold as a concentrate in solvent. For application, AEGIS Antimicrobial is diluted with water. The hydrolyzed material in the dilute solution then covalently or ionically bonds with the target surface and covalently bonds with itself to form a durable copolymer. Any CAS numbers shown below are for the “as supplied” form of the antimicrobial. No CAS Numbers have been assigned for the intermediate hydrolyzed form or for the resulting copolymer; neither of which are articles of commerce.

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION											
ÆGIS Environments 3106 Swede Avenue Midland, MI 48642-3843	Telephone: (989) 832-8180 Fax: (989) 832-7572										
MSDS No. 64881-3 Current Version: 7/26/00											
<table style="width: 100%; border: none;"> <tr> <td style="padding-right: 10px;">Generic Description:</td> <td>Organosilane polymer</td> </tr> <tr> <td>Physical Form:</td> <td>Solid</td> </tr> <tr> <td>Color:</td> <td>Colorless to pale yellow</td> </tr> <tr> <td>Odor:</td> <td>None</td> </tr> <tr> <td>NFPA Profile:</td> <td>Health 1 Flam mability 0 Reactivity 0</td> </tr> </table>		Generic Description:	Organosilane polymer	Physical Form:	Solid	Color:	Colorless to pale yellow	Odor:	None	NFPA Profile:	Health 1 Flam mability 0 Reactivity 0
Generic Description:	Organosilane polymer										
Physical Form:	Solid										
Color:	Colorless to pale yellow										
Odor:	None										
NFPA Profile:	Health 1 Flam mability 0 Reactivity 0										
Note: NFPA: National Fire Protection Association											

SECTION 2 – OSHA HAZARDOUS COMPONENTS			
<u>CAS Number</u>	<u>Wt%</u>	<u>Component</u>	<u>Exposure Limits</u>
027668526	84	(Octadecylaminodimethyltrihydroxysilylpropyl ammonium chloride) _x	Copolymer -- None
002530872	16	(Chloropropyltrihydroxysilane) _x	Copolymer – None

SECTION 3. EFFECTS OF OVEREXPOSURE	
<u>Acute Effects</u>	
Eye:	No untoward effects.
Skin:	No untoward effects.
Inhalation:	Not applicable.
Oral:	No untoward effects. LD ₅₀ = 12.27 gm/kg (Albino Rats)
<u>Prolonged/Repeated Exposure Effects</u>	
Skin:	No untoward effects.

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

Inhalation:	Not applicable.
Oral:	No untoward effects.
<u>Signs and Symptoms of Overexposure</u>	No known applicable information.
<u>Medical Conditions Aggravated by Exposure</u>	No known applicable information.
The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions, component data and/or expert review of the product. Please refer to Section 11 for detailed toxicology information.	

SECTION 4. FIRST AID MEASURES	
Eye:	No effects expected from treated materials.
Skin:	No effects expected from treated materials.
Inhalation:	Not applicable.
Oral:	No effects expected from treated materials.
Comments:	Any unsuspected and unexplained irritations or reactions in the presence of treated substances should be brought to the attention of a physician.

SECTION 5. FIRE FIGHTING MEASURES	
Flash Point (Closed Cup):	None
Autoignition Temperature:	Not Applicable
Extinguishing Media:	Not Applicable
Fire Fighting Procedures:	Not Applicable
Unusual Fire Hazards:	None
<u>Hazardous Decomposition Products:</u>	
Thermal breakdown of this product during fire or very high heat conditions may evolve the following hazardous decomposition products: Carbon oxides and traces of incompletely burned carbon compounds. Nitrogen oxides. Chlorine compounds. Silicon dioxide. Formaldehyde.	

SECTION 6. ACCIDENTAL RELEASE MEASURES	Not Applicable
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SECTION 7. HANDLING AND STORAGE	Not Applicable
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SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION	Not Applicable
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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES	
Physical form:	Solid

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

Color:	Colorless to pale yellow
Odor:	None
Specific Gravity @ 25C:	Not Applicable
Viscosity:	Not Applicable
Freezing/Melting Point:	Not Applicable
Boiling Point:::	Not Applicable
Vapor Pressure @ 25C:	None
Vapor Density:	Not Applicable
Solubility in Water:	None
pH:	Not Applicable
Volatile content:	0.0%

Note: The above information is not intended for use in preparing product specifications. Contact AEGIS before writing specifications.

SECTION 10. STABILITY AND REACTIVITY	
Chemical Stability:	Stable
Hazardous Polymerization:	Will not occur.
Conditions to Avoid:	None
Materials to Avoid:	Oxidizing materials.
Comments:	None

SECTION 11. TOXICOLOGICAL INFORMATION	
<u>ACUTE TOXICOLOGY DATA FOR PRODUCT</u>	Complete information is not yet available

SECTION 12. ECOLOGICAL INFORMATION			
<u>Environmental Fate and Distribution</u>	No specific information is available.		
<u>Ecotoxicity</u>	No specific information is available.		
<u>Persistence and Degradation</u>	No specific information is available.		
Ecotoxicity Classification Criteria			
Hazard Parameters (LC ₅₀ or EC ₅₀)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	≤1	>1 and ≤100	>100
Acute Terrestrial Toxicity (mg/kg)	<-100	>100 and ≤2000	>2000

ÆGIS ENVIRONMENTS

MATERIAL SAFETY DATA SHEET

This table is adapted from "Environmental Toxicology and Risk Assessment", ATMA STP 1179, p. 34, 1993.

This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

SECTION 13. DISPOSAL CONSIDERATIONS

RCRA Hazard Class (40 CFR 261)

When a decision is made to discard this material, as received, is it classified as a hazardous waste? No

Federal Hazardous Waste Code: Not Applicable

Characteristic Waste: Ignitable: D001 Corrosive: Not Applicable Reactive: Not Applicable

TCLP: Not Applicable

State or local laws may impose additional regulatory requirements regarding disposal.

Call AEGIS, (517) 832-8180, if additional information is required.

SECTION 14. TRANSPORT INFORMATION

DOT Road Shipment Information (49 CFR 172.101)

Proper Shipping Name: Not Applicable

Hazard Technical Name: Not Applicable

Hazard Class: Not Applicable

UN / NA Number: Not Applicable

Packing Group: Not Applicable

Call AEGIS, (517) 832-8180, if additional information is required.

SECTION 15. REGULATORY INFORMATION

Contents of this MSDS comply with the OSHA Hazard Communication Standard 29CFR 1910.1200

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

EPA SARA Title III Chemical Listings:

Section 302 Extremely Hazardous Substances: None

Section 304 CERCLA Hazardous Substances: None

Section 312 Hazard Class:

Acute: No

Chronic: No

ÆGIS ENVIRONMENTS MATERIAL SAFETY DATA SHEET

Fire: No

Pressure: No

Reactive: No

Section 313 Toxic Chemicals: None

Supplemental State Compliance Information

<u>CAS Number</u>	<u>Wt</u> <u>%</u>	<u>Component</u>
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California

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause cancer.

None Known.

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause birth defects or other reproductive harm.

None Known.

Massachusetts

None

New Jersey

027668526	84	Octadecylaminodimethyl trihydroxysilylpropyl ammonium chloride
002530872	16	Chloropropyltrihydroxysilane

Pennsylvania

027668526	84	Octadecylaminodimethyl trihydroxysilylpropyl ammonium chloride
002530872	16	Chloropropyltrihydroxysilane

SECTION 16. OTHER INFORMATION

Prepared by: AEGIS Environments.

These data are offered in good faith as typical values and not as product specifications. No warranty, either express or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.

™ indicates Trademark



These surfaces can only be treated using water as a diluent. Complying with all aspects of the law is mandatory when handling, using, or disposing of any antimicrobial.

ÆGIS Environments is committed to providing the best possible service to you. We ask that you read and follow the guidelines given below to assure the maximum effectiveness of The ÆGIS Microbe Shield Program.

Please recognize that this is not a cleaning program. To obtain the best results, both microbially and aesthetically, all surfaces which are to be treated should be cleaned before treatment. If surfaces are soiled or stained when they are treated, they will still be soiled and stained after treatment. Generally, surface grime will not affect the initial antimicrobial activity, but it will shorten effective life and heavy grime will smear or streak in treatment. The unique ÆGIS Microbe Shield Program incorporates an odorless, colorless, water-based, surface modifying technology which alters the characteristics of any treated surface – including dirt and grime. Once applied, it is extremely durable and withstands normal cleaning. If the treated surface layer is removed by abrasion or aggressive cleaning or is covered by paint or some other substance, the antimicrobial activity will be eliminated or reduced.

Site Preparation:

1. General: All personal items should be removed or replaced in desks or cabinets. Computers and other electronic equipment must be covered with plastic sheets or removed. ÆGIS will not be responsible for damage to these items. The ÆGIS Microbe Shield Program includes use of an antimicrobial material which is spray applied in a dilute water solution. No matter how careful the treatment is applied, there will be overspray during application. The overspray is beneficial to most surfaces, but papers and delicate items could be spotted or damaged by the water.
2. Soiling & Debris: Ordinary soiling of carpeting and walls will not interfere with the ÆGIS Microbe Shield Program. Heavy soiling and debris (paper, dust, grease, cigarette tars, etc.) Must be cleaned or removed before treatment. Cleaning materials/chemicals should be thoroughly rinsed away. Heavily soiled walls are likely to streak from the treatment.
3. Vacuuming: General housekeeping procedures are acceptable. No extraordinary measures are required. In highly contaminated areas, HEPA filters should be used on vacuums or workers should have respiratory protection.

4. Carpet Cleaning: Most professional carpet cleaning services are satisfactory, but it is extremely important to completely remove residual surfactants and cleaners left by wet techniques and powders left from dry techniques. Equipment should be appropriate for cleaning in corners and close to walls.
5. Visible Fungal Growth & Stains: If fungal growth is so severe that visible colonies have formed or stains are evident, they must be cleaned before treatment. Use of a dilute bleach solution is recommended. Peroxide solutions may also be useful. The ÆGIS Microbe Shield Program will control surface growth but will not remove dead organisms or stains.
6. Wallpaper: Loose seams, tears, and bubbles must be repaired. Excess adhesives from the repair work must be removed with a fresh-water rinse.
7. Carpet Protectors: Chair mats must be removed before treatment and not replaced until carpeting has dried completely (usually 6 - 8 hours).
8. Large Furniture Items or File Cabinets: Carpeting and flooring under large, seldom moved furniture items or cabinets is usually not treated. If treatment under these items is required, they must be removed from the treatment area and stored until the carpeting or flooring has dried completely.
9. Pictures, Wall Hangings, and Furniture Attached to Walls: any items that obstruct treatment of the target surfaces must be removed and placed in a safe place until treatment is completed. Large items (such as headboards) which are attached to walls must be dismantled.
10. Wall Dividers and Bulletin Boards: All notes, memoranda, posters, etc. that can be removed must be stored until treatment has been completed.
11. Drying: Dry as quickly as possible. Damp surfaces will soil and smear easily. Foot traffic should be minimized until surfaces are dry. If possible, operate the HVAC system in a heat cycle for 6 - 8 hours following application of the treatment. Fans are helpful, but not required.



Overview:

The keystone of the ÆGIS Microbe Shield™ Program is the application of the ÆGIS Antimicrobial. This unique material chemically alters the surfaces to which it is applied and literally becomes part of these surfaces. These newly created surfaces have an active antimicrobial effect is extremely durable – but it can be removed or deactivated if abused.

To maintain the greatest effectiveness and longevity, three basic factors should be remembered: 1) The antimicrobial surface layer can be removed by abrasion; 2) it can be deactivated by highly caustic materials (over pH 11); and 3) it can be temporarily inactivated if a film or other covering prevents direct contact with microorganisms.

Conventional antimicrobial materials are designed to dissipate into the air or into solution and be absorbed by organisms. Once absorbed, they act by poisoning the organisms or causing fatal mutations. In contrast, ÆGIS Antimicrobial does not dissipate and acts by rupturing the organisms cell wall on contact. If contact is prevented by some covering material (such as soap film or layer of pollutants) the antimicrobial effect is lost until the covering film or pollutant is removed.

Basic Maintenance Rules: Surfaces treated with ÆGIS Antimicrobial can be effectively maintained with normal housekeeping procedures. To assure that treated surfaces retain their maximum effectiveness, a few simple rules should be followed.

1. General good housekeeping practices should be followed. Frequent vacuuming or washing will remove much of the soil on which organisms feed and will not harm the antimicrobial.
2. Any liquids spilled on carpets or other treated surfaces should be cleaned up immediately. They, like soil, can offer a breeding ground for microorganisms.
3. Treated carpeting may be steam cleaned or cleaned with conventional cleaning processes. Chemical processes should be followed with a rinse extraction step to remove residual films.
4. Never use scouring pads or abrasive cleaners on treated areas.
5. Do not use highly caustic agents (over pH 11) on treated areas.
6. Painting, waxing, or applying surface treatments to treated areas produces a new surface that is not microbiocidal and prevents the ÆGIS Antimicrobial from acting.

7. All newly installed or renovated surfaces should be treated with ÆGIS Antimicrobial to prevent the development of microbial reservoirs within the building.
8. Any condition which indicates a failure of ÆGIS Antimicrobial to perform effectively (odors, visible growth) should be reported immediately to ÆGIS so that remedial action can be taken.

Form #11M

POTENTIAL MICROBIAL SOURCES AND AMPLIFICATION SITES

HVAC SYSTEMS

AIR INLETS – Outside Air, Return Air, Mixed Air

Are areas clean, dry, properly drained and trapped for moisture? Accumulated debris will support microbial growth and hold moisture.

Are other access panels tight with sealing strips in order to avoid induced infiltration.

FILTER BANKS – Filter Efficiency, Bypass Prevention, Change out Procedures

Is filter efficiency sufficient to trap target pollutants - dust, pollen, mold and bacteria?

Are filters tight to the frame in order to prevent bypassing? Is there a visual or instrumentation system for detecting broken filters? If filters are suspected of having bio-contamination, are there procedures for change out that minimize risks of down stream contamination? Are activated carbon filters needed to control odors?

COILS/DRAIN PAN – Clean, Existing Inspection Schedule

Are coils clean? Is there a scheduled inspection for accumulated dirt or slime? Are drain pans working properly - no standing water, wet or dry material buildup, properly trapped? Are traps sized properly for the positive/negative pressure at the drain point. Are liquid seal legs in traps checked/maintained - what frequency?

DUCT RUNS – Clean, Major Inspection Points

Is there impinged dust at fire dampeners, mixing boxes, elbows up-stream of diffusers? Any signs of past standing water? Are joints tight and not allowing infiltration from plenum areas?

DIFFUSERS – Clean & Accessible

If dirty, is dust impinged from the room or duct work? Does discharge cause visible impingement of room dust on louvers, ceiling or wall surfaces? Is there a schedule for removing and cleaning diffusers and adjacent ductwork?

BUILDING PRESSURIZATION – Positive Or Negative

Potential pressure differentials caused by prevailing winds may create localized infiltration zones, also driving force to move pollutants inside the building envelope independent of the HVAC system.

Are there infiltration routes for moisture, dust, and microorganisms?

STRUCTURE

SURFACES – Interior

Typical surfaces which support growth or hold dust which supports growth include carpet, bulletin boards, wall hangings/paintings, drapes, furniture - all surfaces, ceiling tiles, textured ceilings, wall paper and adhesive, under lavatories and water closets, corners of rooms, floor/wall and ceiling/wall interface zones, cabinets - especially under sinks, janitor closets and room baseboard heaters.

ENVELOPE

Typical infiltration points - roofing penetration and edge seals, fenestrations, mortar joints, expansion joints, below-grade wicking of moisture and gasses, sump pump crocks.

PATHWAYS

These include utility chases, elevator shafts, dumbwaiter shafts, stairwells, exhaust ducts where the fan is inside the building, about ceiling plenums, raised floor systems, opening next to penetrations into crawl spaces.

HOUSE KEEPING & MAINTENANCE

VACUUM CLEANERS

Use high efficiency filters to avoid spreading microbes or preferably a central vac system which exhausts to the building exterior.

REFRIGERATORS

Are refrigerator drain pans and coils checked regularly and cleaned? Are vending machines scheduled for cleaning underneath and behind.

WATER LEAKS

As Soon As Possible - locate the source, fix, dry and disinfect moisture affected areas.

Upholstered Furniture:

Remove loose cushions and treat all fabric surfaces lightly, include underneath surfaces of chairs, couches, beds, etc. Be aware that the ÆGIS Antimicrobial solution will tend to bead initially on the surface of fabrics. The treatment needs to reach the base of the fiber and the backing. Jostle the cushions or work in with a cloth or brush.

Wood Furniture:

Unfinished surfaces are most vulnerable. Check under chairs, inside cabinets and dressers, backs/bottoms/sides of drawers, picture frames (be careful of expensive artwork), cardboard storage boxes in closets and attics. Contaminated paper products should be placed in heavy plastic bags, sealed and removed for disposal to a sanitary landfill.

Walls:

Test for dust before treatment, wipe drips and runs immediately after treating to avoid spotting. Use as fine a spray tip as available and treat with a crossing pattern. Some applicators use a squeegee after spraying walls.

Wipe dry all smooth surfaces to avoid water spotting.

Carpets:

Shag and plush carpets should be groomed with a carpet rake(leaf rake will work) to work the treatment down to the base. When treating carpets, the entire tuft down to the backing needs to be treated. Shag and plush carpets require more antimicrobial treatment than tight loop commercial carpets due to the increased amount of fiber surface in a taller tuft. Vacuum carpets well with a fine filtered machine prior to treatment. Carpets damp from steam(hot water) extraction will wick better and tend to require less treatment than dry carpets. Use plastic or foil carpet pads to avoid causing stains from rust or wood stain.

Draperies:

Make certain fabric is clean and will not hang unevenly when damp from treatment. Lightly treat both sides.

Silk plants/flowers:

Lightly mist all surfaces.

Live Plants:

Treat pot exterior - moisture and nutrients moving from interior to exterior surface makes treatment very difficult. Dirt and plant - not much to do but set outside or isolate from individual having problems.

Kitchen:

Do not treat direct food-contact surfaces such as cutting boards.

Refrigerators - clean coils and evaporator pan. Are door gaskets clean? Is interior clean? Frost-free air circulation system is very difficult to clean and treat once contaminated.

Closets:

If musty - wash/dry clean clothes and treat all surfaces in closet.

Bath Rooms:

Shower curtains - treat both sides. Shower doors - treat tracks, bottom frames, wash cloth and towel bars which may have hidden growth areas.

Toilet tanks - treat interior & exterior, seal area between tank and bowl. Is exhaust fan clean with no backdraft? Check under sink piping and cabinet space, hidden crevasses under handles. Is grout at tiles intact?

Laundry Room:

Dryer vent - clean & no backdraft. Is dryer vented to the outside?

Is area clean behind and alongside washing machine and dryer?

HVAC System:

Is cabinet & coil clean? Is drain pan properly trapped?

Are duct joints sealed including penetrations thru floors and walls from crawl, attic, and other unprotected areas.

Is makeup air part of system design?

Is makeup air properly filtered? Is makeup air for furnace/water heater open vented into a utility closet from the attic, crawlspace or outside?

Plumbing:

Do pipes sweat and drip? Is there fungus on pipes or at drip line?

Are valves leaking at the stem? Any signs of leaks at tub, sink or toilet bowl gaskets?

Crawl Space:

Mix ratio: 3 oz. of ÆGIS Antimicrobial per gallon of water.

Treat bottom of floor joist. Treated dirt surfaces should be left undisturbed. Laying down visqueen slows down moisture movement but does not solve the problem of a damp crawl space.

Attics:

Are eve and ridge vents open to allow free flow of air?

Exhaust Fans & Drier Vents:

Are fans and vents exhausted to building exterior and not dumped into crawl space or attic?

NOTES:

Over-application promotes surface condensation in cool and damp areas. The surface condensate then becomes a trap and growth point for fungi.

Operate ventilation systems in a mode which promotes drying.

Consider using dehumidifiers to help remove moisture, especially in high-moisture areas with poor circulation.

If the outside air is dry, there is no dust, and a low spore count, consider venting the house with outside air. Harvest time has a tendency to elevate airborne quantities of soil colonizing fungi.

Vinyl wall coverings often provide for the growth of microorganisms and set up the conditions where the wall system under the covering becomes contaminated. The resulting odors, staining and deterioration can be simply discomforting or ugly or can destroy the vinyl wall covering and the substrate on which it is hung.

Vinyl wall coverings by their chemical and physical make-up are almost always the key water-vapor barrier in a wall system. In effect they stop the migration of moisture from within the wall system into the occupied space. The installation of these coverings requires some substrate preparation and the use of an adhesive. The nature of these adhesives is such that they are very good nutrients for microorganisms. Although many of these adhesives contain preservatives to control microbial growth, these have not proven to be effective over the expected life of the covering. Complicating the nature of microbial growth in such systems is the fact that many of the materials of construction in such systems come pre-inoculated with microbial contamination. Also, contamination is an inevitable part of the construction or renovation process. This, of course, is aggravated by climate, weather conditions, stage of construction and care of the workers. Contamination on the surface of the vinyl is generally caused by soil build-up that provides the nutrients and a water condensation point on which the microbes can live. The major microbial culprits in these systems are fungi.

All of this describes a system where the nutrients, moisture and receptive surfaces needed for microbial growth exist and where the presence of the "seed" organisms are found. Understanding these dynamics and determining the extent of, and the source of, the contamination is critical to an effective mitigation and control strategy.

SURFACE GROWTH

One of the most common reasons for surface growth on vinyl is the residue of wall covering paste that is left behind after the installation process. Such residues often allow for very definite patterns of fungal growth along seams and/or at ceiling or baseboard interfaces. Of course, the normal build-up of soil, especially in dirty or greasy environments, also accommodate the growth of microbes.

Most surface growth is as described above and can be readily cleaned off. The costs, exposure of workers to contamination, mess, disruption and ineffectiveness of this is often burdensome. This is a major value point and justification for the use of the ÆGIS Microbe Shield™ Program.

BELOW WALL COVERING GROWTH

Frequently, when stripping vinyl wall coverings, colonies of fungi are found in varying concentrations. Once these organisms have been found, one needs to determine several things: 1). Are any of the associated organisms of human health concern? 2). Where did the moisture come from that allowed for the problem levels of the organisms to be present? and 3). Are the affected substrates salvageable or are they so destroyed that they need to be replaced?

In the majority of cases, the vinyl wall covering is acting as a vapor barrier. In this situation, as the room is cooled, moisture in and behind the wallboard moves to the barrier and condenses. This is sometimes complicated by improper installation or use of vapor barriers within the wall system. The condensed moisture, wall covering paste and wallboard paper provide the perfect environment for any fungal spores, trapped during construction, to germinate and multiply.

In dealing with this type of contamination problem, the entire wall system should be reviewed. On the surface is the vinyl, followed by the paste where the fungi are living. Their reproductive structures and feeding filaments, called hyphae (mats of hyphae are called mycelia), grow and spread in this environment. Some of these organisms produce a water-soluble pigment that further disfigures the surface of the vinyl with red or black stains. Below the paste is the paint, sizing, or skim coat on the paper of the wallboard. The nutrition and moisture gathering parts of the fungi can extend through this coating and into the gypsum of the wallboard. Growth into the insulation and other components of the wall cavity may also occur. Of course, this growth pattern can occur in the opposite order also. For example, a leaking roof, a porous or cracked envelope, a failed caulking or a plugged weep tube can all give rise to a moisture build-up in the wall cavity. Such a build-up accelerates the normal growth that occurs in such spaces and can be a serious source of subsequent odors and deterioration. This scenario is not exclusive to exterior walls and is frequently the scenario played out for contamination of interior walls. One of the dramatic and common situations seen in the field is where an exterior wall is the source of the moisture, but the contamination plays itself along one or two panels of wallboard into the building.

Use of a bleach solution as described in *ÆGIS Microbe Shield Treatment for Hard Surfaces* is recommended to deal with the initial microbial contamination load, to decolorize the surface, reduce the organic load, and to prepare the surface for treatment. Alcohol solutions are also sometimes warranted for this type of surface clean-up and preparation. Read the guide carefully, noting the precautions and need for care in preventing bleeding of dyes. The bleach solution should penetrate the surface and destroy the fungi along with removing some of the staining. This removal of the organic material represented by the contamination provides for a more durable *ÆGIS Antimicrobial Treatment*. **WARNING!** Use of excessive bleach solution in order to effect a deeper penetration may lead to loss of structural integrity

of the wallboard or the paper. The hazards to people and structural materials associated with using chlorine bleach need to be considered and appropriate protection used.

Treatment of the drywall with ÆGIS™ Antimicrobial at this point will likely be covered with fresh paint or wall covering. This, of course, reduces the availability of the antimicrobial for controlling surface microbial contaminants. It also raises the important question of, what surfaces should or should not be treated. There is no single answer as every contamination situation and the complexity of substrates demands slight variation of treatment tactics.

The best treatment application would be to both the unfinished and finished surfaces of the room. A single application to only the finished surface should not be encouraged unless there is considerable assurance that the moisture conditions are under control and maintainable. If there is no assurance of moisture control then application of ÆGIS Antimicrobial should be done on a Best Effort basis only. Following are some experiences from which you can see the pros and cons of treating a surface prior to finishing or post finishing.

ÆGIS technicians have experienced situations with flood damaged drywall that was cleaned and then painted with a water-base paint which immediately experienced a heavy fungal bloom. This situation was controlled by two different methods. The freshly painted areas that were experiencing fungal growth were cleaned and immediately treated with ÆGIS Antimicrobial. Unfinished areas were pretreated with ÆGIS Antimicrobial and allowed to dry prior to painting. Both areas stayed free of reoccurring growth.

The area that was pretreated prior to painting offers no protection to the occupied space of the room, however, painted hard surfaces typically are low risk areas unless unusual soiling, cooling and associated condensation or other moisture conditions exist.

If the wallboard has been completely or partially demolished, time should be spent with the owner or the owner's representative to assess the source of the moisture and control options. Treatment of contaminated spaces behind remaining wallboard and stud cavities is prudent. However, verifying that growth has been controlled, for warranty purposes, is difficult without destroying the wallboard.

If a one-time application of ÆGIS Antimicrobial is all the owner is willing to afford, then the applicator and owner should carefully consider the most appropriate time to apply the ÆGIS Antimicrobial as a preventative treatment.

SUMMARY

Following are some "short-hand" points that should help you and the representative for the facility properly target the problem areas and help plan for dealing with the microbial components of the problem.

Discussion points for controlling air movement from wall cavities:

- Wall cavities should be sealed to prevent movement of odors and spores into occupant areas.
- Switch Plates/Outlets should be weather stripping or caulked.
- Windows & Doors should be weather stripped or caulked under trim.
- Baseboards should be weather stripped or caulked at floor/wall interface.

Note that all of these categories are places where investigation for problems can be focused.

Discussion points for controlling moisture movement through walls when the stud cavity is the moisture source:

- Wallpaper or other coating should be breathable.
- Paste should be synthetic vs. natural — lower food value.
- Paste should have an antimicrobial mildewstat as part of its formulation.
- Paint should allow passage of water vapor.
- Avoid creating vapor barrier conditions at an area which is chilled sufficiently to cause condensation, such as directing air conditioned air on vinyl covered bath, laundry, or kitchen walls where humidity levels are traditionally high.

CONSIDERATIONS FOR ÆGIS Antimicrobial APPLICATION

When treating porous hard surfaces, use a two pass crossing pattern to apply treatment.

Use of finer spray tips for application is recommended. The surface needs to be thoroughly wetted; however, runs or large drops indicate excessive application.

Drips or runs on finished surfaces must be wiped with a rag or sponge soaked in ÆGIS Antimicrobial to avoid spotting.

ÆGIS Antimicrobial is a surface treatment. If wood is heavily contaminated it may need replacing as subsurface fungi may remain active and contribute to wood rot.

Accumulated dust and debris in stud spaces should be removed prior to treatment and controlled during refurbishing. Accumulated debris provides a moisture sink and food source for future growth.

Surfaces which appear to be clean should be checked by touch or preferably with a light-colored wipe to detect if any film is present. Any film should be removed prior to treatment. It is particularly difficult to apply ÆGIS Antimicrobial to surfaces that have waxy or oily coatings. These coatings should be cleaned thoroughly prior to treatment so as to prevent future removal of the ÆGIS Antimicrobial when the surface is stripped or cleaned.

SPRAY REPORT

Protected by The



Date: _____
Project No. _____

Customer Information

Name: _____ Address: _____
City: _____ State: _____ Zip Code: _____ Telephone: () _____

Building Information

Building Type: _____ Construction: _____ Approximate Age: _____ Years
Approximate Size: _____ s.f. Condition: _____ HVAC Type: _____

Microbial Information

Prior Inspection Odors Visible Growth Staining Allergies SBS/BRI
Water Incursion Soiling Debris Other _____

Areas / Surfaces Treated

	(Floors/Walls/Ceilings/Above Ceiling Surfaces/Other: List)	Odors/Stains/Growth
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____
11	_____	_____
12	_____	_____
13	_____	_____
14	_____	_____
15	_____	_____
16	_____	_____
17	_____	_____
18	_____	_____

Mixing Information

Antimicrobial Lot Number: _____

	Oz. Wetting	Oz. AEGIS	Gal. Mixed
Totals Mixed			

Mixed Gallons Used: _____

Equipment Check List

Spray Equipment

- Sprayer 24 gal
- Sprayer 3 gal
- Extension Cord
- Hose
- Wands ___ (qty.)
- Teflon Tape
- Nozzles (qty.)
 - ___ HCX2
 - ___ HCX4
 - ___ 8004
 - ___ 8002
 - ___ 8001
 - ___ 005F65
- Strainer/Check
- Cap Nuts
- Measuring Cup
- Goggles
- Rubber Gloves
- Wipes/Towels

Chemicals

- AEGIS Concentrate
- Surfactant
- Tide (dry)

Paperwork

- MSDS
 - Concentrate
 - Application Strength
 - Applied
 - Surfactant
- Bill of Lading
- D.O.T. Package
- Contract Forms

- Pre/Post-Treatment Info sheets
- Spray Report
- Sample Log
- Survey Forms
- Pre-Job Safety Meeting

Miscellaneous Equipment

- Tape Measure
- Camera
- Solomat
- Sample Bags
- Cotton Swabs
- Air Sampler
- Agar Plates
 - Saboraud's Dextrose Agar _____
 - Potato Dextrose Agar _____
 - Tryptic Soy Agar _____
- Clear Tape
- Duct Tape
- Ladders
- Tie-down Cords
- Fans ___ (qty.)
- Drop Cloths
- Carpet Rake
- Tool Kit

Personal Protective Equipment

- Coveralls
- Lab Coat
- Hat
- Respirator/Cartridges
- Dust Masks
- Safety Glasses
- Hard Hat
- Steel-toed Shoes
- Leather Gloves

Overview:

To properly apply a uniform treatment of the ÆGIS Antimicrobial on all of the surfaces to be treated, the application equipment being used must be functioning properly. This means that the equipment must be maintained properly in order to achieve uniform application of the antimicrobial.

Cleaning and Storage of Equipment:

The spraying systems used to apply the ÆGIS Antimicrobial require maintenance in accordance with the manufacturers' owners manual. Additional to this maintenance, the equipment should be flushed with fresh water and then drained immediately after use. Large capacity systems may have working solutions left in the storage tank if they are stored at temperatures above freezing and below 90°F. Long-term storage of solution at elevated temperatures will promote gelling of the antimicrobial in the equipment.

If the system won't spray;

- Check the switch to make certain the power is on.
- Check the inlet line and strainer leading to the pump for obstructions.
- Relieve back-pressure on the pump by opening the applicator valve on the spray wand, removing the tip from the wand and discharging the solution back into the tank.
- Check for a pinched hose.
- Check hose attachments for proper connections.
- Check for clogged spray tip. If clogged, soak in hot soapy water and scrub with a nylon bristle brush or cotton swab.

If the system output has low volume;

- Check for a pinched hose.
- Check hose attachment for proper connections.
- Check for clogged strainers at tank and spray wand.
- Check for clogged spray tip. If clogged, soak in hot soapy water and scrub with a nylon bristle brush or cotton swab.

If there is an irregular pattern to the spray;

- Tip damaged - discard and replace.
- Tip not properly flushed after last use - soak in hot soapy water and scrub with a nylon bristle brush or cotton swab.

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[Form #11P \(Aftercare Application Manual\)](#)

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