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April 15, 2010

Stewart Averett
EcoActive Surfaces
551-D NE 27th Street
Pompano Beach, FL 33064

RE: MIL STD 810G Method 508.6 - Fungus

- Project #2010-59
- Date Samples Received: 3/12/10
- Date Testing Started: 3/16/10
- Date Testing Ended: 4/13/10
- Date Report Issued: 4/16/10

Dear Mr. Averett,

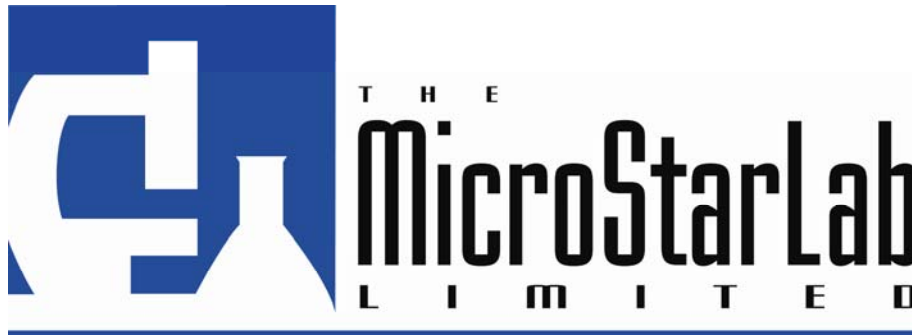
The final report for the MIL STD 810G Method 508.6 Fungus test you requested is attached.

If you have any questions, please do not hesitate to call.

Best regards,

Judy LaZonby

President – The MicroStar Lab, Ltd



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Crystal Lake, IL 60014
(815) 526-0954

Final Report for:
EcoActive Surfaces, Inc
551-D NE 27th Street
Pompano Beach, FL 33064

Test Method:
MIL STD 810G Method 508.6
MSL Project # 2010-59
Sample Received: 3/12/10
Testing Initiated: 3/16/10
Testing Completed: 4/13/10
Report Issued: 4/16/10

Judy LaZonby
President – The MicroStar Lab, Ltd





Objective:

The purpose of this test is to assess the extent to which materiel will support fungal growth. If the materiel is found to support fungal growth, the following will also be determined:

- The species of the fungi that is present
- How rapidly the fungus will grow on the materiel and a description of the growth
- Any affects the fungus may cause to the materiel, for example, any detrimental effects, physical interferences on performance, or health and aesthetic factors.
- If the materiel can be stored effectively in a field environment.
- Any reversal processes, for example, wiping off the fungal growth, if this is of interest to the customer.

Pre-test Documentation:

Two test pieces were submitted for testing. The samples were identified as followed:

1. Seat Belt #1 (Restraint)
2. Seat Belt #2 (EA Webbing)

The test sequence, environmental test history, or pre-test operations were not specified prior to testing. Testing followed MIL STD 810G Method 508.6 protocol.

The test chamber was a glass aquarium approximately 30" x 12" x 19" in size fitted with a glass top. The bottom of the tank contained approximately 1 inch of distilled water to maintain humidity. Above the water a grate was placed to protect test pieces or controls from inadvertently falling into the water at any point during testing. Test pieces and controls were suspended using clips and cable ties attached to rods. Prior to testing the chamber was decontaminated using hot water and a quaternary amine microbial decontaminant cleaner. A small fan was placed in the chamber in order to achieve the required air velocity.

The inoculum was prepared from pure fungal stock cultures incubated at $30 \pm 1^\circ\text{C}$ for 10 to 21 days. The following U.S. group test fungi were used:

1. *Aspergillus flavus* ATCC 9643
2. *Aspergillus versicolor* ATCC 11 730
3. *Penicillium funiculosum* ATCC 11 797
4. *Chaetomium globosum* ATCC 6205
5. *Aspergillus niger* ATCC 9642

Spore suspensions containing $1,000,000 \pm 20\%$ spores per milliliter as determined with a counting chamber were prepared for each organism. The viability of the spore suspensions were verified by inoculating the entire surface of Potato Dextrose Agar plates and checking for growth after 7 to 10 days incubation at $30 \pm 1^\circ\text{C}$. See results below in Table #1. Equal volumes of the individual fungal cultures were blended to obtain the mixed spore suspension to be used for inoculation of test items.

Control strips of unbleached, plain weave cotton cloth cut into 3 cm X 4 inch strips were dipped into the solution described within the method and allowed to dry. These strips were hung within





the chamber close to and bracketing test items to ensure the test strips and test items experience the same test environment. The test chamber containing the test pieces and control strips was held in the test facility for 4 hours prior to inoculation to equilibrate to $30 \pm 1^\circ\text{C}$ and a relative humidity of greater than 90% and less than 100%.

Each test item and control strip was inoculated with the mixed spore suspension by spraying the items with a fine mist from a sterile atomizer. The items were covered completely with the spore suspension on both sides, spraying until drops began to form on the surface. Immediately after spraying, the test items and control strips were suspended from rods in the test chamber. The test chamber contained water to maintain the desired relative humidity required by the test method of greater than 90% and less than 100%. The chamber was placed within a walk-in incubator to begin incubation. The temperature within the test chamber was maintained at $30 \pm 1^\circ\text{C}$ for the duration of testing as required by the test method.

Humidity and temperature probes and sensors are checked using the following equipment:

- Veriteq Data Logger, NIST traceable certificate # 0147218, Serial #09102071



See Table #2 for the record of critical components for this test. Temperature and relative humidity readings are reported to the nearest whole degree.

After 7 days, the growth on the control strips was inspected. The control strips were checked again at the end of testing for an increase in fungal growth. See results below.

Provided the control strips and viability of spore suspensions were acceptable, the test was continued for 28 days incubation. At the end of the incubation, the samples were examined for fungal growth. Results are described in the Post Test Documentation section below. The assigned ratings were determined using the rating scheme in Table #3 that is listed in the method.




During Test Documentation:

Table #1. Viability of Individual Spore Suspensions

Organism	Percent Coverage	Viability Plate at 7 Days Incubation	
<i>Aspergillus niger</i> ATCC # 9642	100%		
<i>Aspergillus flavus</i> ATCC # 9643	100%		





<i>Aspergillus versicolor</i> ATCC # 11730	100%			
<i>Penicillium funiculosum</i> ATCC # 11797	100%			
<i>Chaetomium globosum</i> ATCC # 6205	100%			

Temperature and Humidity were maintained throughout the entire test period. See Table 2 and attached chart and the end of this report.

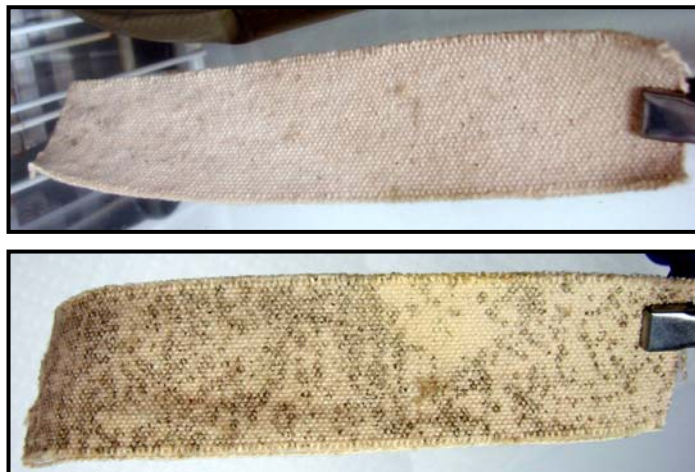
Table #2 – Record of Critical Components

Critical Component	Pre-Condition	Week 1	Week 2	Week 3	Week 4
Temperature (30 ± 1°C)	30.3	30.2	29.9	30.0	29.9
Humidity (>90% and <100%)	96.3	98.1	97.7	95.1	95.0

MIL STD 810 G Method 508.6 Critical Component Requirements:

- Temperature cannot exceed 40°C
- Temperature cannot exceed 32°C for 4 hours or more
- Temperature cannot go below 28°C and have a drop in humidity to less than 90%.
- If temperature does fall below the test parameters (29°C) but humidity has been maintained at 90% or greater, reestablish test conditions and continue test at the point the test fell below the prescribed tolerances.
- Relative humidity cannot drop below 50%
- Relative humidity cannot drop below 70% for 4 or more hours
- If there is evidence of deterioration of fungal growth on the control strips that may be due to test interruptions which affected the temperature and humidity, the test must be restarted.





The picture on the top is a chamber control strip at Day 7. The picture on the bottom is a chamber control strip at Day 28. At Day 7, all control strips had acceptable fungal growth to confirm the viability of the spore suspension and that the environment was suitable for fungal growth. At Day 28, all chamber controls had an increase in fungal growth as compared to Day 7 as required by the test method. All chamber controls performed as expected confirming the validity of the test.

Post Test Documentation:

Two test samples and five control samples were tested for 28 days. The testing was performed without interruption. Performance data was not required.

Upon removal of the chamber at Day 28, the test pieces were evaluated following the rating scheme listed below in Table #3. Test pieces were first examined with an unaided eye and then more closely inspected with a stereoscope. Any possible fungal growth was examined by tape preparation and microscopic evaluation. Fungal growth was determined to be test organisms or non-test organisms. Since samples are not sterile prior to testing, it is not uncommon non-test organisms that are native to the test samples will appear.

Table #3 – Evaluation Scheme for Visible Effects and Test Sample Ratings

Amount of Growth	Rating	Comments
None	0	Substrate devoid of microbial growth
Trace	1	Scattered, sparse or very restricted microbial growth
Light	2	Intermittent infestations or loosely spread microbial colonies on substrate surface. Includes continuous filamentous growth extending over the entire surface, but underlying surfaces are still visible
Medium	3	Substantial amount of microbial growth. Substrate may exhibit visible structural change
Heavy	4	Massive microbial growth

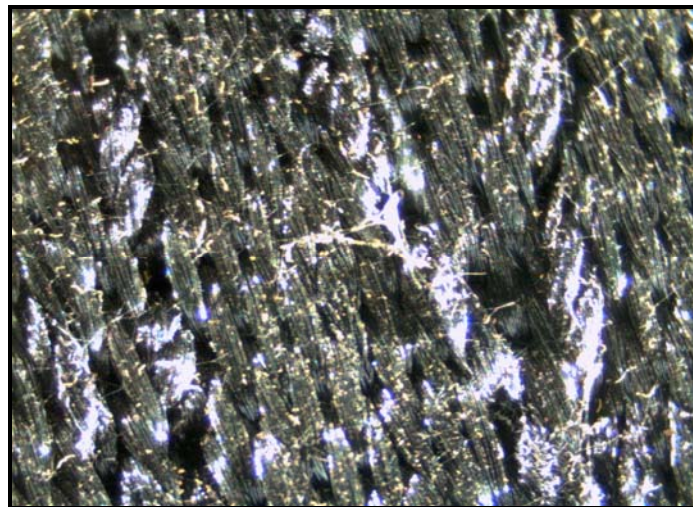




Sample #1	Rating	Description of Growth
Seat Belt #1 (Restraint)	3	Fungal growth across the entire sample surface



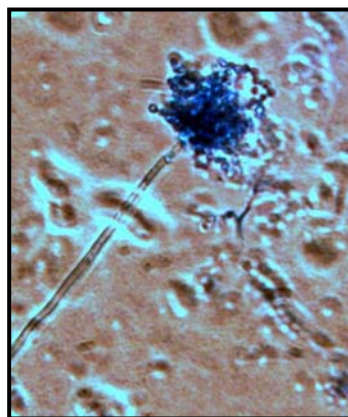
This test piece had continuous fungal growth that was across the entire sample surface.



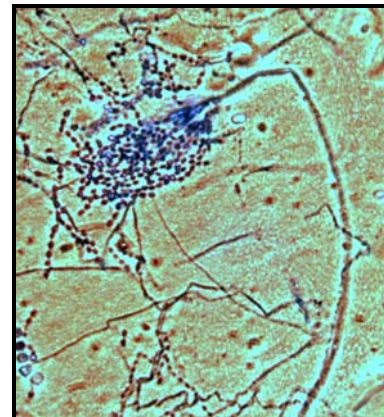
The photograph above is a stereoscope view of the black, belt area. The fungal growth on this test piece included *Aspergillus flavus*, *Aspergillus versicolor*, and *Penicillium funiculosum*, photomicrographs of which were taken from the tape preps and are shown below.



Aspergillus flavus



Aspergillus versicolor

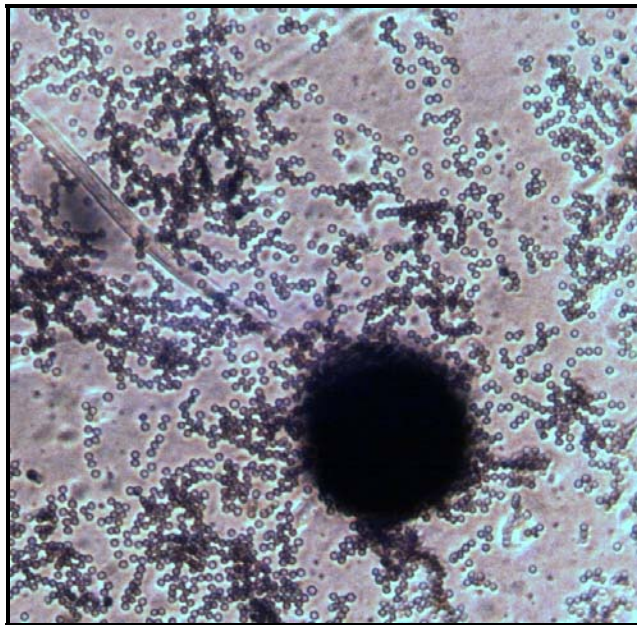


Penicillium funiculosum





Sample #2	Rating	Description of Growth
Seat Belt #2 (EA Webbing)	3	Fungal growth across the entire sample surface with intermittent areas with more substantial growth.



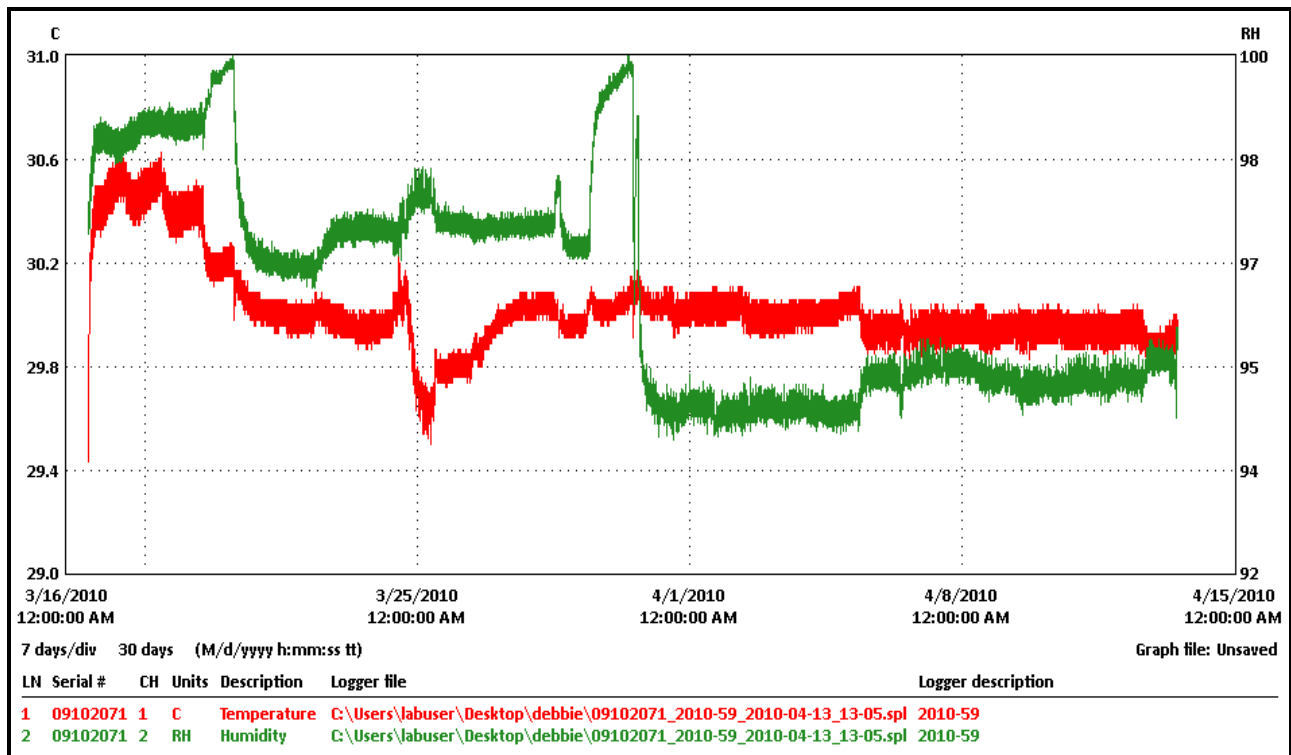
Besides *Aspergillus versicolor*, *Aspergillus flavus*, and *Penicillium funiculosum*, Seat Belt #2 (EA Webbing) also recovered *Aspergillus niger* (pictured above).





Conclusions

- Test samples supported substantial fungal growth after 28 days incubation with test organisms. These results are recorded in the Post-Test Documentation Section.
- The amount of fungal growth in the pictures occurred over the course of 28 days. When the control strips were checked for growth after 7 days, the test pieces were only inspected within the chamber with the unaided eye and had trace amounts of visual fungal growth. Descriptions of the Day 28 growth are given in the Post-Test Documentation Section.
- The fungal growth did not appear to affect the integrity of the surface of the samples. No staining or deterioration of the surfaces was noted. Physical interference and detrimental effects on performance were not evaluated at this time. Any item with fungal growth may pose a health risk for persons with allergies to mold.
- The fungal growth appeared such that wiping of the surface could partially remove the growth from site but not completely eliminate the fungus from the test pieces. Aesthetically, most of the fungal growth was visible with the unaided eye.



Temperature and relative humidity were maintained throughout the testing cycle. At two time points, relative humidity increased slightly and adjustments were made to the test chamber, bringing the relative humidity into a more stable range.

