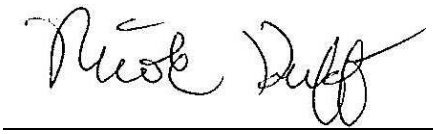
Engineering Report 52570-1

Fungus Test

for

Pelican Products, Inc.

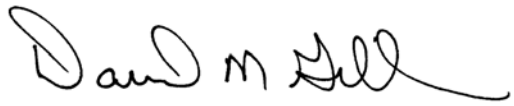
Prepared by



Nicole T. Duff, Technical Writer

Donald M. Knutson, Ph.D., Biologist

Approved by



David M. Gillen, Vice President

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9725 Girard Avenue South • Minneapolis, MN 55431
952-888-7795 • FAX 952-888-6345 • 800-826-3710
www.environlab.com

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Revision history

Revision	Total number of pages	Date	Description
--	10	July 13, 2015	Original

Prepared for:	Test dates	
Pelican Products, Inc.	**Start:**	6/11/2015
Attention: Mohammad Hakami	**Completion:**	7/9/2015
	Environ test number:	**52570-1**
	Purchase order number:	**MH060915**
	Purchase date:	6/8/2015

Fungus Test

1.0 Abstract

1.1 Object

Subject one Case and seven Material Samples to a Fungus Test as specified in *MIL-STD-810G*, with Change 1, dated April 15, 2014, Method 508.7, as requested in Pelican Products, Inc. purchase order MH060915, dated June 8, 2015.

1.2 Conclusions

Examination of the samples upon completion of the incubation period found no evidence of fungal growth. The samples were assigned a *MIL-STD-810* rating of 0.

2.0 Unit(s) tested

Table 2-1: Units tested

Manufacturer	Pelican Products, Inc.				
Device	One (1) Case	Seven (7) Material Samples			
		One (1) Gasket	One (1) Vent	One (1) Red Label	Four (4) Plastic Samples
Model/part number	1500	N/A	N/A	N/A	Yellow, Orange, Green, Tan
Assigned number	1	6	7	8	2, 3, 4, 5

The results of this test apply only to the units identified in this Engineering Report by device identifier and model / part number, or serial number.

3.0 Test requested

Subject one Case and seven Material Samples to a Fungus Test as specified in *MIL-STD-810G*, with Change 1, dated April 15, 2014, Method 508.7.

A mixed-spore suspension containing *Aspergillus niger, Aspergillus flavus*, *Aspergillus versicolor, Penicillium funiculosum*, and *Chaetomium globosum,* shall be prepared. The test samples shall be conditioned for at least 4 hours at 30°C ±1°C (86°F ±2°F) and 95% ±5% relative humidity prior to inoculation. Place the test samples in the fungus chamber along with cotton fabric control strips. Inoculate the samples and the cotton strips with the fungal spore suspension by spraying the suspension onto the strips and sample with a fine mist from an atomizer.

Incubate the test samples 30°C ±1°C (86°F ±2°F) and 95% ±5% relative. After 7 days of incubation, inspect the cotton control strips and verify chamber conditions are right for fungal growth. At least 90% of the surface area of each control strip shall be covered by fungi. If the growth is satisfactory, the chamber shall be resealed and the incubation continued until a total of 28 days has elapsed. The samples shall then be examined for fungal growth and rated according to Table 3-1 below.

Table 3-1: Microbial test evaluation scheme (*MIL-STD-810G*, Method 508.7)

Amount of growth	Grade	Organic substrates
None	0	Substrate is devoid of microbial growth.
Trace	1	Sparse or very restricted microbial growth and reproduction. Substrate utilization minor or inhibited. Little or no chemical, physical, or structural change detectable.
Slight	2	Intermittent infestations or loosely spread microbial colonies on substrate surface and moderate reproduction.
Medium	3	Substantial amount of microbial growth and reproduction. Substrate exhibiting chemical, physical, or structural change.
Heavy	4	Massive microbial growth or reproduction. Substrate decomposed or rapidly deteriorating.

4.0 **Instrumentation, procedure, and results**

4.1 Instrumentation

All instrumentation is calibrated regularly by instruments directly traceable to the National Institute of Standards and Technology, and in accordance with *MIL-I-45208A, ANSI/NCSL Z540.3-2006,* and *ISO/IEC 17025: 2005*.

Table 4-1: Instrumentation list

Equipment Number	Description	Manufacturer	Model Number	Last Calibration	Due Calibration	Range
200-151	Temperature Controller	Watlow	920	3/17/2015	3/17/2016	-328ºF to +662ºF
501-006	Fungus Chamber	Environ	F1	N/A	N/A	Ambient to +120ºF; 50% to 98% RH
810-002	Microscope	Meiji	EMT-2	N/A	N/A	10X; 30X
950-058	Data Logging System	Fluke	2686A	4/20/2015	4/20/2016	-200°C to +400°C; 0% to 100% RH; 0 to 25 psia

4.2 Procedure

A mixed-spore suspension was prepared in accordance with *MIL-STD-810G*, with Change 1, Method 508.7, Paragraph 4.4.3.2 using the American cultures listed in Section 3.0. The test units were placed in the incubation chamber. Cotton control strips were also placed near the samples in the chamber at this time. The test units were conditioned for 4 hours at 86°F and at 97% relative humidity. The test units and the cotton control strips were then inoculated with the mixed-spore suspension. The chamber was sealed, and the controls were programmed to provide the temperature and humidity cycle described in Section 3.0 of this report.

After 7 days, the chamber was opened and the cotton control strips were examined for sufficient fungal growth. Proper fungal growth was verified, so the chamber was again sealed, and the incubation period continued. Upon completion of the 4-week exposure, the test units were removed from the chamber and immediately examined for evidence of fungal growth under the microscope.

4.3 Results

Examination of the samples upon completion of the incubation period found no evidence of fungal growth. The samples were assigned a *MIL-STD-810* rating of 0.

The test units were returned to Pelican Products, Inc. upon completion of the test.

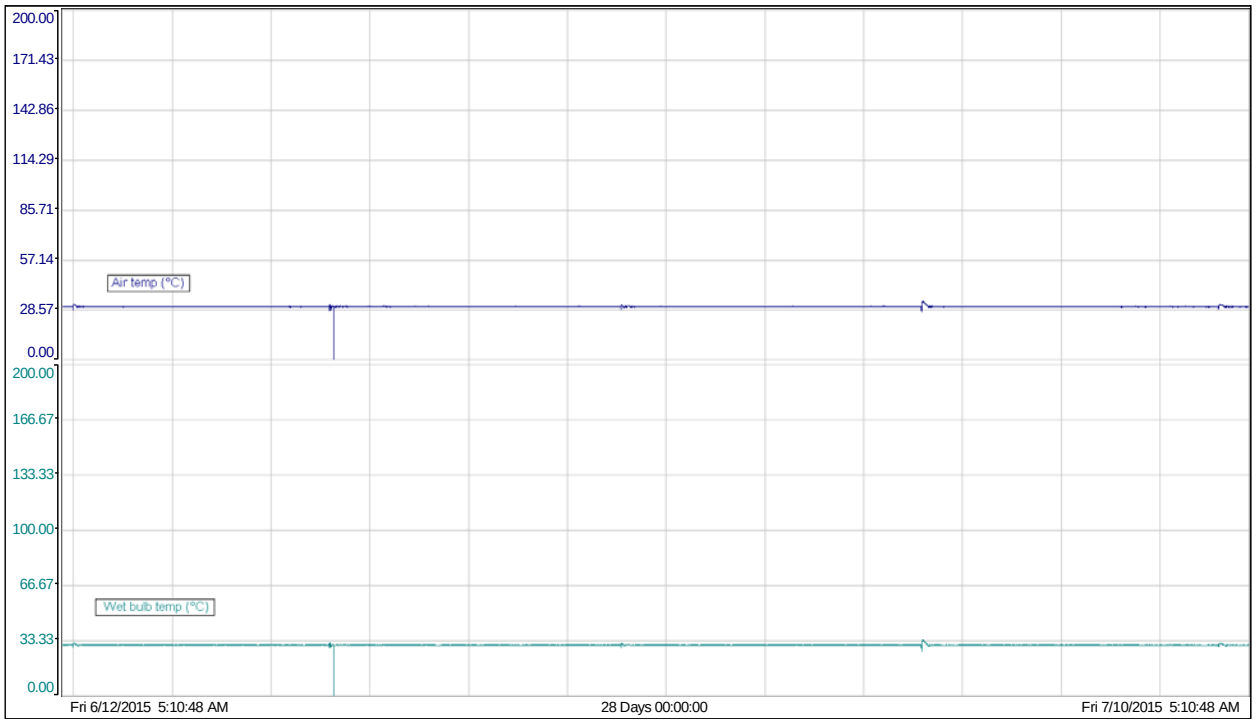

Figure 4-1: Graph showing the chamber wet bulb / dry bulb temperatures (°C) during the incubation period

Photograph 4-1: Test units in the chamber prior to inoculation

Photograph 4-2: Case upon completion of the incubation period

Photograph 4-3: Yellow Plastic Sample upon completion of the incubation period

Photograph 4-4: Orange Plastic Sample upon completion of the incubation period

Photograph 4-5: Green Plastic Sample upon completion of the incubation period

Photograph 4-6: Tan Plastic Sample upon completion of the incubation period

Photograph 4-7: Gasket upon completion of the incubation period

Photograph 4-8: Vent upon completion of the incubation period

Photograph 4-9: Red Label upon completion of the incubation period