



# FINAL REPORT

## Material Resistance to Fungi PROTOCOL ASTM G21

ORDER Number  
152004170

### PREPARED FOR

Reliance Worldwide  
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Poway, CA 92064

8/20/2020

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## Certificate of Analysis

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CLIENT: RELIANCE WORLDWIDE CORPORATION

CONTACT: RYAN MILLER

PROJECT: ASTM G21

PRODUCT: FOAM MATERIAL – SAMPLE 1

**CHALLENGE FUNGI:**

*ASPERGILLUS NIGER* (ATCC 16404)  
*PENICILLIUM PINOPHILUM* (ATCC 11797 )  
*CHAETOMIUM GLOBOSUM* (ATCC 6205)  
*GLIOCLADIUM VIRENS* (ATCC 9645)  
*AUREOBASIDIUM PULLULANS* (ATCC 15233)

SAMPLE RECEIVED: 7/7/2020

REPORT DATE: 8/20/2020

**EXPERIMENTAL SUMMARY:**

The testing procedure was designed after discussions between EMSL Analytical, the testing company, and the client. The testing procedure is ASTM G21, with the testing conducted on synthetic polymeric material against fungi.

**Procedure:**

Individual 2-inch diameter samples were received in triplicate. Fungal species were grown separately on Malt Extract Agar (MEA) for 7 - 14 days. The spore suspension of each of the five fungi was prepared by pouring 10 mL of sterile DI water containing 0.5 mL of Tween 20 into the culture plate. The surface growth was gently scraped from the culture of each test organism. The spore suspension was transferred into a centrifuge tube containing 25 mL of sterile DI water and 10 solid glass beads. The centrifuge tube was vortexed for one minute to break the spore clumps. The spore suspension was filtered through a thin layer of glass wool in order to remove mycelial fragments.

The spore suspension was washed three times in DI water by centrifugation and diluted to achieve a  $1.0 \times 10^6$  spore/mL for each fungal species. Spore suspensions were then combined using equal volumes of resultant spore suspension. Both sample coupons and control filter paper were placed separately onto Nutrient Mineral Salts agar and an even layer of mixed spore suspension was sprayed onto each material sample.



Plates were incubated at 25°C and examined weekly. The standard length of the test is 28 days. The test may be terminated in less than 28 days for samples exhibiting a growth rating of two or more. All tests were performed in triplicate.

Pictures were taken before and after to show comparison of fungal growth on test and control materials. Fungal results are reported according to the following rating system in Table 1 from ASTM G21:

1: Observation for Visible Effects Observed Growth on Specimens	Rating
None	0
Traces of growth (less than 10%)	1
Light growth (10 – 30%)	2
Medium growth (30 – 60%)	3
Heavy growth (60 – 100%)	4



### Experimental Results:

Figure 1 – ASTM G21 – Growth Observation @ T = 0

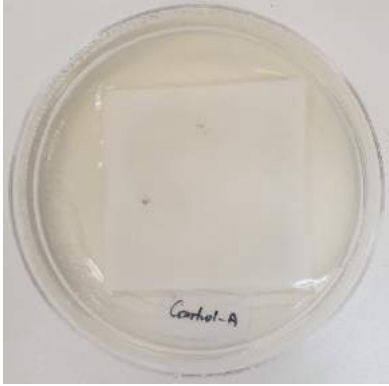

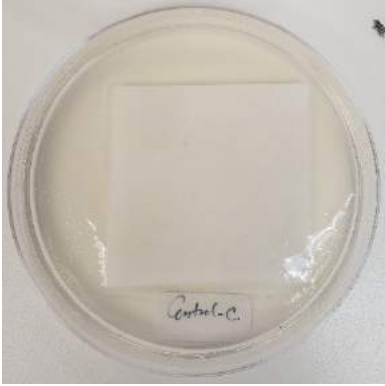
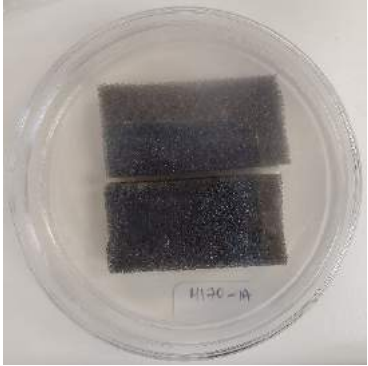
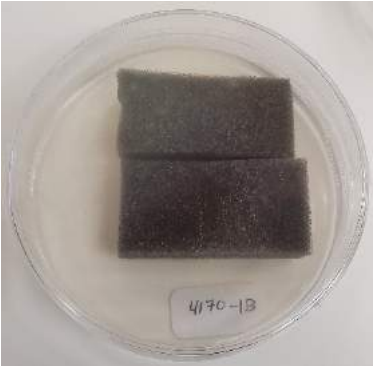
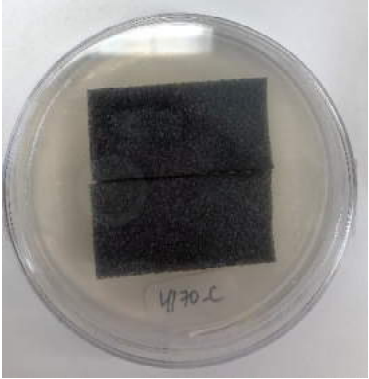
			<b>Average Growth Rating</b> <hr/> <b>0</b>
Control A @ T=0	Control B @ T=0	Control C @ T=0	
			<b>0</b>
Sample 1A @ T=0	Sample 1B @ T=0	Sample 1C @ T=0	



Figure 2 – ASTM G21 - Growth Observation @ 7 days

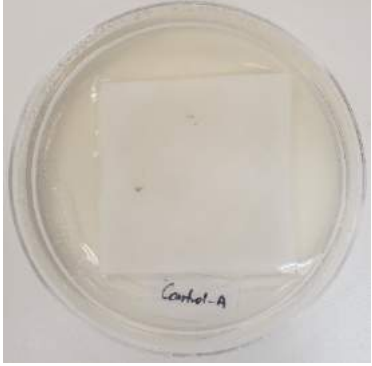

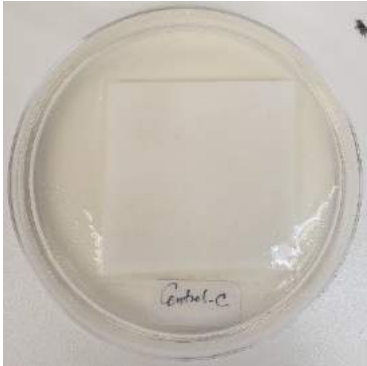
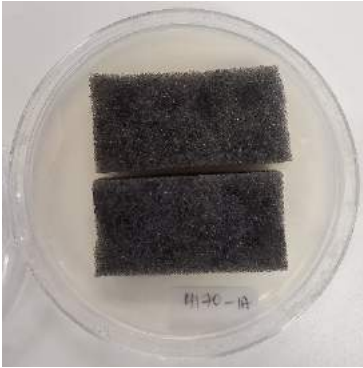
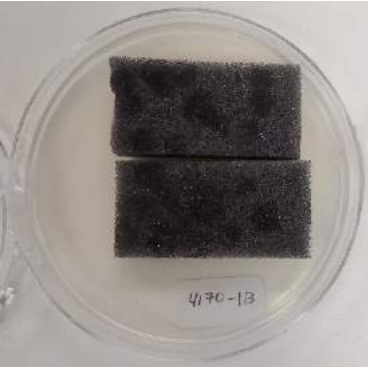
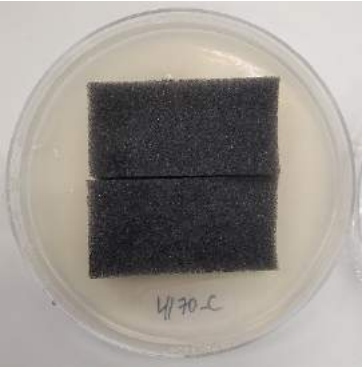
 <p>Control A @ T = 7 days</p>	 <p>Control B @ T = 7 days</p>	 <p>Control C @ T = 7 days</p>	<p>Average Growth Rating</p> <hr/> <p>2</p>
 <p>Sample 1A @ T = 7 days</p>	 <p>Sample 1B @ T = 7 days</p>	 <p>Sample 1C @ T = 7 days</p>	<p>0</p>



Figure 3 – ASTM G21 - Growth Observation @ 14 days

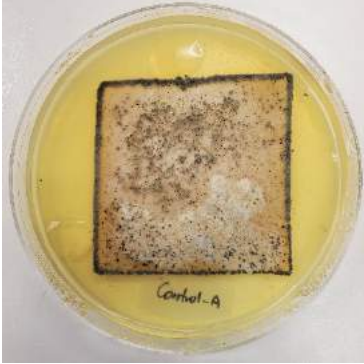
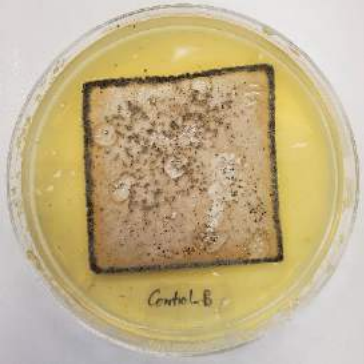
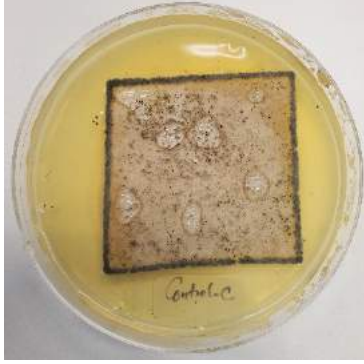
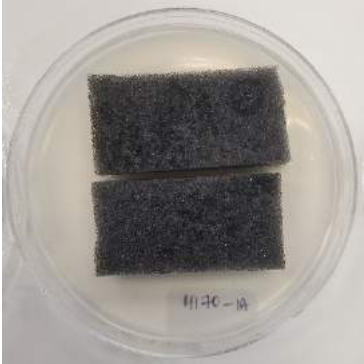
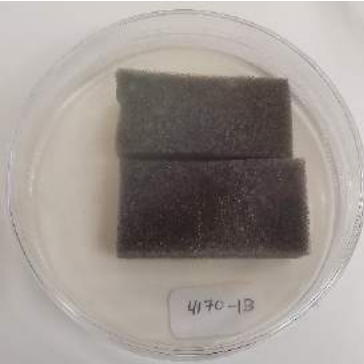
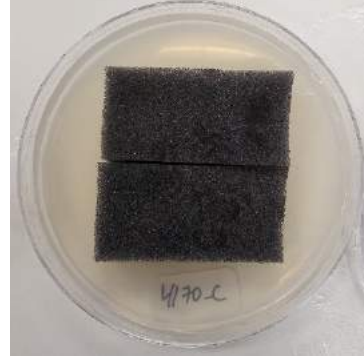
 <p>Control-A</p>	 <p>Control-B</p>	 <p>Control-C</p>	Average Growth Rating
Control A @ T=14 days	Control B @ T=14 days	Control C @ T=14 days	4
 <p>4170-A</p>	 <p>4170-B</p>	 <p>4170-C</p>	
Sample A1 @ T= 14 days	Sample A2 @ T= 14 days	Sample A3 @ T= 14 days	0



Figure 4 – ASTM G21 - Growth Observation @ 21 days

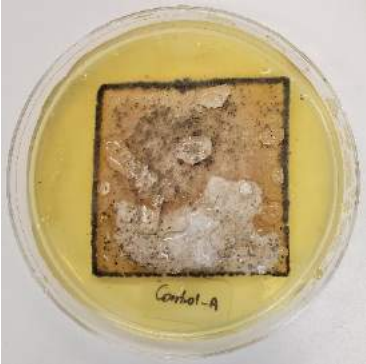
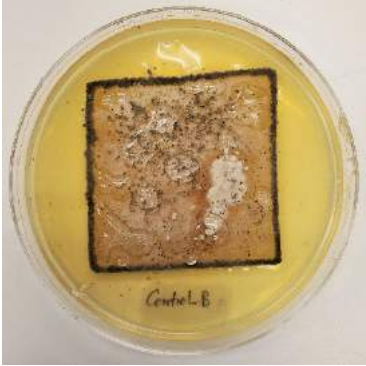
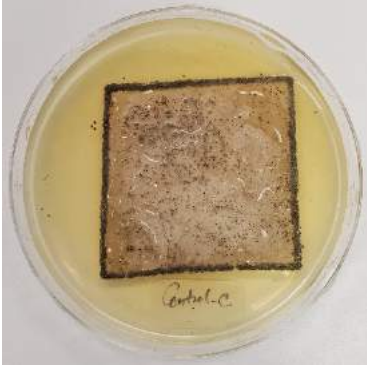
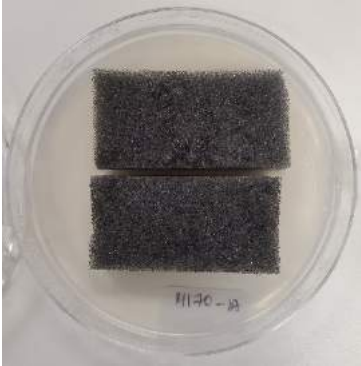
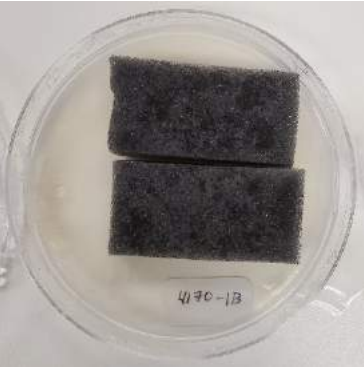
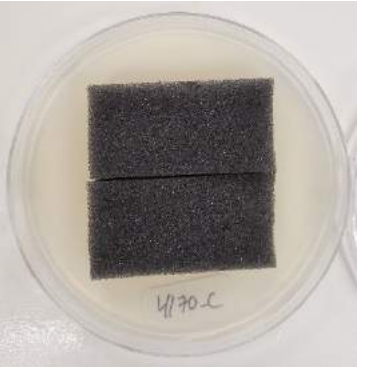
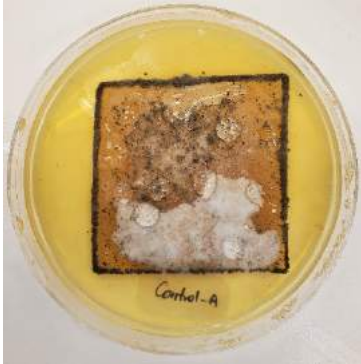
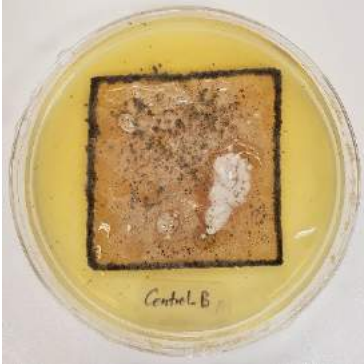
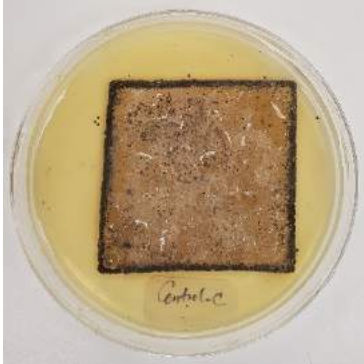
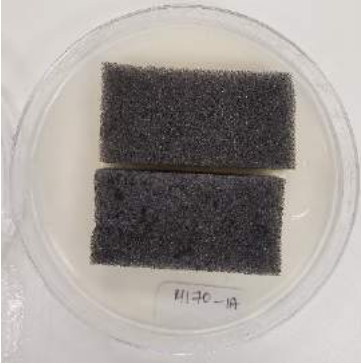
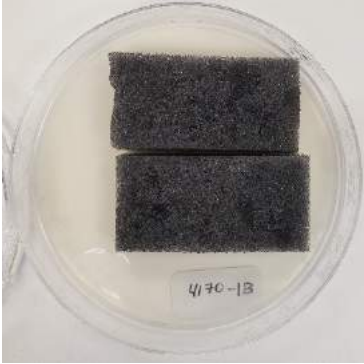
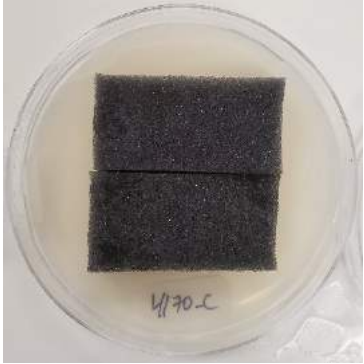
 Control A @ T=21 days	 Control B @ T=21 days	 Control C @ T=21 days	Average Growth Rating <hr/> 4
 Sample 1A @ T= 21 days	 Sample 1B @ T= 21 days	 Sample 1C @ T= 21 days	0



Figure 5 – ASTM G21 - Growth Observation @ 28 days

 Control A @ T=28 days	 Control B @ T=28 days	 Control C @ T=28 days	Average Growth Rating <hr/> 4
 Sample A1 @ T= 28 days	 Sample A2 @ T= 28 days	 Sample A3 @ T= 28 days	0





Conclusions/Observations:

The samples from Reliance Worldwide Corporation were evaluated for their resistance to fungi. The samples received a rating of 0 which means that no growth was detected after 4 weeks of incubation. Therefore, the samples were found to be resistant to fungal growth.

A handwritten signature in black ink, appearing to read "Jason Dobranic", is positioned above a horizontal line.

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