TECHNICAL BULLETIN

Fungus resistance testing of PVC-coated fabrics (ASTM G-21)

Introduction

This report presents the results of fungus resistance testing conducted on PVC-coated fabrics containing *Borogard*® ZB. The testing was performed in accordance with ASTM G-21, a standard protocol for determining the resistance of synthetic polymeric materials to fungal growth. ASTM G-21 involves exposing materials to a mixed fungal spore suspension and incubating them under controlled conditions to assess fungal colonization over time.

The test is widely used to evaluate the durability and microbial resistance of materials used in various industrial and consumer applications.

Materials and methods

Four sets of PVC-coated fabric samples were tested. Each set included four specimens, designated as PVC-1, PVC-2, PVC-3, and PVC-4.

The PVC formulations are as follows:

Components (phr)	PVC-1	PVC-2	PVC-3	PVC-4
PVC (Geon)	100	100	100	100
DOP plasticizer	50	50	50	50
Stabilizer	3	3	3	3
ESO co-stabilizer	5	5	5	5
Antimony trioxide (ATO)		15	7.5	
Borogard ZB			7.5	15

The fungal strains used for testing were:

- *Aspergillus niger* (ATCC 9642)
- *Penicillium funiculosum* (ATCC 9644)
- *Chaetomium globosum* (ATCC 6205)
- *Trichoderma sp.* (ATCC 9645)
- *Pullularia pullulans* (ATCC 9348)

Thirteen-day cultures of each fungus were harvested and adjusted to a spore concentration of 1,000,000 (±200,000) spores/ml. The combined spore suspension was sprayed onto both the test samples and control filter paper. Samples were placed on sterile nutrient salts agar and incubated at 30°C for 28 days. Weekly observations were recorded.

Results

Fungal growth was rated weekly using the following scale:

0 = No growth
1 = Traces of growth
2 = Light growth
3 = Moderate growth
4 = Heavy growth

Sample (side)	7 days	14 days	21 days	28 days
PVC-1 (fabric) PVC-1 (PVC)	1 1	2 2	3 3	3 3
PVC-2 (fabric) PVC-2 (PVC)	2 2	2 2	2 3	2 3
PVC-3 (fabric) PVC-3 (PVC)	1 1	1 1	1 3	1 3
PVC-4 (fabric) PVC-4 (PVC)	1 1	1 2	1 2	1 2
Control	4	4	4	4

Discussion and conclusion

The results indicate varying degrees of fungal resistance among the tested PVC-coated fabrics. PVC-2 (ATO) exhibited moderate fungal growth throughout the test period, while PVC-4 (*Borogard* ZB) showed minimal growth. The presence of *Borogard* ZB reduced the fungal colonization but did not completely inhibit it.

The picture at the right shows the samples after testing.

Control samples consistently showed heavy growth, validating the effectiveness of the test protocol.

Cotton side

PVC side