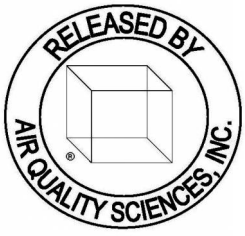
AIR QUALITY SCIENCES

A MICROBIAL RESISTANCE EVALUATION OF INDOOR MATERIALS

AIR KRETE INSULATION SAMPLE

prepared for

AIR KRETE



May 16, 2003
Date

AQS Report No. 10681-02

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Released by Air Quality Sciences, Inc.
Date Prepared: May 16, 2003
AQS Project #: 10681
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EXECUTIVE SUMMARY

PROJECT DESCRIPTION

Air Quality Sciences, Inc. (AQS) is pleased to present the results of its microbial resistance evaluation of Air Krete's indoor material identified as "Air Krete Insulation Sample". AQS conducted this study using a microbial test protocol following the requirements of ASTM Guideline D 6329-98 (1). This ASTM method is established to study indoor materials for their ability to support mold growth. Testing of the indoor material was conducted using static environmental chambers operating at 75% humidity (considered a "high normal" for indoor commercial spaces) and 95% humidity (considered an extreme moisture condition within buildings). Air Krete's indoor material was inoculated with two representative indoor molds, Stachybotrys chartarum and Eurotium amstelodami, and growth rates were measured over a three-week period as the materials were exposed in the two humidity environments. Mold growth is considered significant if it exceeds 20% of the initial baseline levels. Test methodology and results are given in the attached summary reports.

RESULTS

Results show that the "Air Krete Insulation Sample" was resistant to mold growth at both 75% and 95% relative humidities. Neither molds were found to amplify in the materials at either humidity.

Summary of test results are included in Attachment A.

MICROBIAL EVALUATION METHODOLOGIES

SAMPLE PREPARATION

The indoor material was provided by Air Krete. Material coupons approximately 3 cm by 5 cm were cut from each panel for testing. These coupons were autoclaved and sterility was verified by testing representative coupons to show that no growth resulted. The coupons were then pre-conditioned in the humidity chambers for one week prior to inoculation.

Spores (conidia) were taken from mature colonies of Stachybotrys chartarum and Eurotium amstelodami grown on 2% malt extract agar. Conidia were collected by flooding 7 day old plates with a sterile peptone/tween solution. The concentration of spores suspended in peptone tween was adjusted to $5x10^3$ CFU/ml and material coupons were inoculated with 0.2 ml.

Three replicate coupons were prepared for each material and each humidity for each measurement time (background and 3 weeks). Coupons were immediately placed in the humidity chambers after inoculation. Coupons for the background measurement were immediately processed after inoculation to determine the baseline inoculum (background) concentration in CFU/coupon.

STATIC CHAMBERS

Products were evaluated for susceptibility to microbial growth using specialized static environmental chambers. These small, 0.04 m^3, chambers are controlled at 25°C with differing humidities. Humidities of 75 ± 5% ("high normal" occupied room conditions) and 95 ± 5% (extreme humidity) were used.

Chambers were held in an incubator to maintain temperature at 25°C. Humidity was controlled with saturated salt solutions; (NaCl for 75% and Na_2HPO_4 for 95%). These solutions were placed in each chamber, which was then sealed prior to being placed in the incubator.

CULTURE ANALYSIS

Standard culture based microbiological analysis was conducted on the coupons by suspending and vigorously agitating each coupon in a flask of peptone tween solution. The resulting spore suspension was diluted and plated onto 2% potato dextrose agar. The dilution plates were visually examined after four days and again at one week to determine the CFU/g and to verify the absence of contamination.

QUALITY CONTROL PROCEDURES FOR MICROBIAL CHAMBER EVALUATIONS

Air Quality Sciences' quality control/assurance plan is designed to ensure the integrity of the measured and reported data obtained during its product evaluation studies. This QC program encompasses all facets of the measurement program from sample receipt to final review and issuance of reports. AQS' protocols and procedures are ISO 9002 certified. The microbiological laboratory is AIHA EMLAP accredited.

Temperature and humidity were monitored continuously in the exposure chambers during the test using electronic dataloggers.

The inherent variability of microbial growth studies was controlled by performing all analyses in triplicate. The technical variability of dilution plating was controlled by performing all platings in duplicate.

REFERENCES

1. ASTM D 6329-98, “Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers”. ASTM, West Conshohokan, PA, 1998.

ATTACHMENT A

SUMMARY DATA REPORTS

MICROBIAL RESISTANCE EXAMINATION OF INDOOR MATERIALS

PREPARED FOR: AIR KRETE
AQS PROJECT: 10681

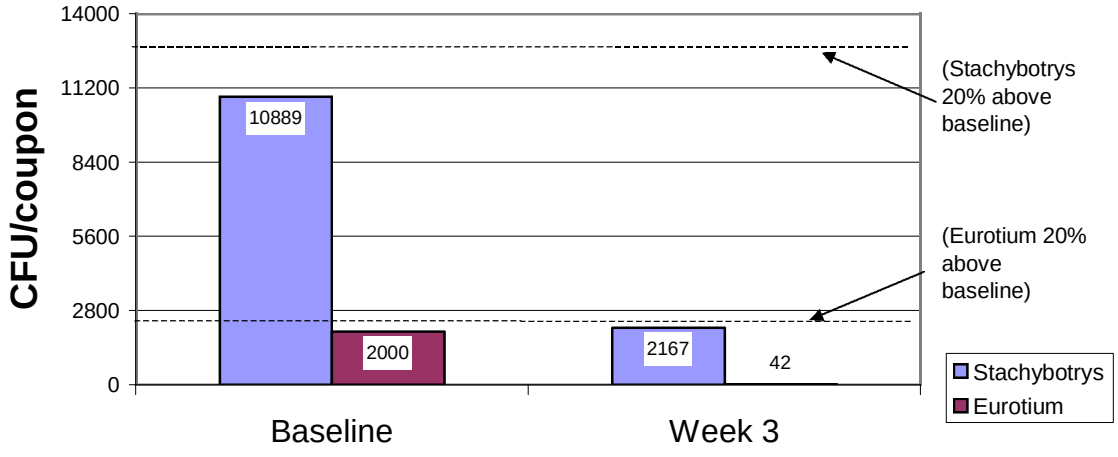
AQS Sample Identification	10681-010AA, FS1
Product Description	Air Krete Insulation Sample

Method:
Spores of two types of molds were initially loaded onto samples of the test material. The baseline value is the number of colony forming units (CFUs) recovered from samples of the test material at the start (after one hour) of the three-week incubation. This value is compared to the number of CFUs recovered in an identical manner from samples of the test material after three weeks of incubation at the stated humidity.

The Air Krete Insulation material was used as supplied, without any pre-conditioning. Samples of the material were exposed by inoculation to two types of common molds under controlled humidity conditions. These humidity levels were regulated with saturated salt solutions at a constant tempertaure of 25°C. The inoculated samples were incubated for three weeks as described in ASTM Standard Guide D6329 to determine the resistance of the Air Krete Insulation material to colonization by the molds.

Results:
The Air Krete Insulation material was resistant to mold colonization under the test conditions at 75% relative humidity. Growth of mold on the material was not significantly greater than 20% of the baseline values.

Microbial Growth Trends
Air Krete Insulation (75% humidity)



date samples received: April 7, 2003
date analysis completed: May 13, 2003

Released by Air Quality Sciences, Inc.
Date Prepared: May 14, 2003
AQS Project #: 10681
AQS Report #: 10681-01

MICROBIAL RESISTANCE EXAMINATION OF INDOOR MATERIALS

PREPARED FOR: AIR KRETE
AQS PROJECT: 10681

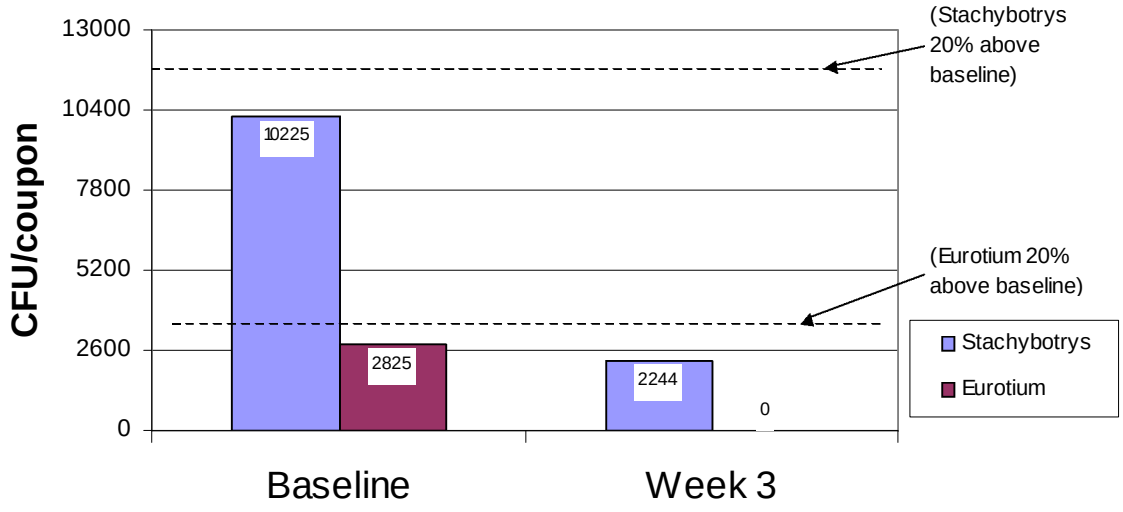
AQS Sample Identification	10681-010AA, FS1
Product Description	Air Krete Insulation Sample

Method:
Spores of two types of molds were initially loaded onto samples of the test material. The baseline value is the number of colony forming units (CFUs) recovered from samples of the test material at the start (after one hour) of the three-week incubation. This value is compared to the number of CFUs recovered in an identical manner from samples of the test material after three weeks of incubation at the stated humidity.

The Air Krete Insulation material was used as supplied, without any pre-conditioning. Samples of the material were exposed by inoculation to two types of common molds under controlled humidity conditions. These humidity levels were regulated with saturated salt solutions at a constant tempertaure of 25°C. The inoculated samples were incubated for three weeks as described in ASTM Standard Guide D6329 to determine the resistance of the Air Krete Insulation material to colonization by the molds.

Results:
The Air Krete Insulation material was resistant to mold colonization under the test conditions at 95% relative humidity. Growth of mold on the material was not significantly greater than 20% of the baseline values.

Microbial Growth Trends
Air Krete Insulation (95% humidity)



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AQS# 10681

10681
Project # 010AA
For AQS Use Only

AIR QUALITY SCIENCES

AQS CHAIN OF CUSTODY RECORD

FS-1

THE ENCLOSED SAMPLE IS SUBMITTED FOR TESTING

PLEASE REFERENCE THE FOLLOWING SAMPLE DESCRIPTION ON ALL APPLICABLE DOCUMENTATION INCLUDING THE FINAL REPORT:

AIR KRETE INSULATION SAMPLES

Sample: FS-1

Company Submitting Sample: _____

Company Contact Information: _____

_____

Date Collected: _____ **Time Collected:** _____

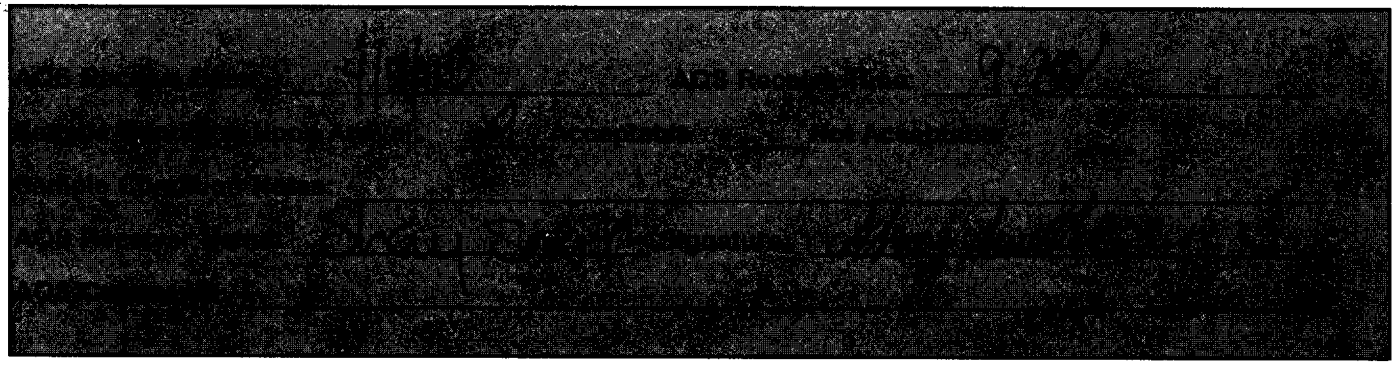
Collector Name: _____ **Signature:** _____

Collector Phone: _____

Shipment Mode: _____

Shipper Receive Date: _____ **Shipper Receive Time:** _____

Shipper Name: _____ **Signature:** _____



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White - Project Files Canary - Sample Pink - Customer Retains