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BOYLE ENGINEERING LABORATORY

DIVISION OF ROTHERM ENGINEERING COMPANY, INC.

CONSULTING AND EXPERIMENTAL ENGINEERING

7280 W. DEVON AVENUE

CHICAGO 31, ILL.

PHONE ROdney 3-8579

SUBJECT: Abstract of Test Report, April 30, 1964

TITLE: Report on Effect of High Velocity Air Stream upon the Surface of Mono-Kote Material.

TEST PERFORMED FOR: Zonolite, Division of W. R. Grace & Company.

OBJECTIVE: Determine if high velocity air stream flowing parallel to and over the surface of Mono-Kote Material would erode surface of Mono-Kote.

TEST SPECIMENS: Three (3) flat aluminum pans, $10\frac{1}{2}$ "W x $15\frac{1}{2}$ "L x $3\frac{3}{4}$ "D filled with Mono-Kote Material having a density of approximately 26.84 lbs. per cu. ft. Surfaces had machine texture finish.

TEST CONDITIONS: Air velocity = 104.8 MPH
Air temperature = 79°F (dry bulb)
Mono-Kote exposed to air stream for 87 hours.

PROCEDURE: Test specimens oven dried for six (6) hours at 118°F to eliminate moisture and then weighted. Test specimens mounted in cut-outs in a triangular shaped duct so that surface of Mono-Kote was flush with duct wall. Velocity traverse taken and test specimens exposed to air stream for 87 hours. Specimens oven dried for seven (7) hours at 115°F and reweighed to determine if erosion of Mono-Kote had occurred.

RESULTS: No erosion of Mono-Kote as indicated by no weight change in test specimens.

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Robert W. T. Olson
Robert W. T. Olson, P.E.



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REPORT

ON

EFFECT OF HIGH VELOCITY AIR
UPON THE SURFACE OF MONO-KOTE MATERIAL
(Revision of Jan. 1964 Report)

Test performed for
Zonolite Division
W. R. Grace & Company

Report consists of
2 pages and 3 data sheets.

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Robert W. J. O'Connor

Robert W. T. Olson,
Professional Engineer

April 30, 1964



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CHICAGO, ILLINOIS

1.

STATUS AND OBJECTIVE

Three (3) flat aluminum pans, having dimensions of approximately 10½ X 15½ X 3/4" and filled with Mono-Kote material, were received by Boyle Engineering Laboratory from Zonolite for the purpose of exposing the Mono-Kote material surface to a high velocity air stream test.

The objective of the test was to determine if the high velocity air stream would erode the surface of the Mono-Kote material.

ABSTRACT

1. Exposure of Mono-Kote surface to a 104.8 M.P.H. air stream for 87 hours caused no erosion of Mono-Kote.
2. Surfaces of test samples were not smooth as would occur for a hand travelled surface but were somewhat rough. Surfaces were machine texture finish.
3. Calculated density of Mono-Kote material used in tests was approximately 26.84 lbs. per cu. ft.

INSTRUMENTATION AND EQUIPMENT

1. 5 H.P. motor and suitable centrifugal blower.
2. Suitable triangular shaped duct in which Mono-Kote samples were mounted.
3. Oven.
4. Beam type pan weight balance, minimum weight division 0.1 gram.
5. Pitot tube.
6. "U" tube water manometer.
7. Psychrometer.
8. Barometer

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CHICAGO, ILLINOIS

2.

PROCEDURE

The Mono-Kote samples were air dried in an oven for six (6) hours at 118°F. to eliminate moisture from test samples. Upon removal from the oven, the Mono-Kote samples were weighed on a beam type pan weight balance having a minimum weight division of 0.1 grams.

A suitable triangular shaped duct was constructed and the aluminum pan Mono-Kote test samples were mounted in cut-outs in the walls of this duct. The cut-outs in the duct wall allowed the surface of the Mono-Kote material in the aluminum pans to be positioned flush with the interior surface of the duct. See Data Sheet 2.

Air velocity in the duct and hence over and parallel with the Mono-Kote sample surfaces was determined by a pitot tube traverse.

Test samples were oven dried for seven (7) hours at 115°F. after the Mono-Kote samples had been exposed to the high velocity air stream for eighty-seven (87) hours. Samples were weighed on gram weight scale to determine if erosion of Mono-Kote had occurred. All pertinent data is recorded on Data Sheets 1 and 2.

Gain or loss of 0.2 grams in the weight of the samples as indicated on Data Sheet 1 was due to normal inaccuracy of weighing scale.

Volume of Mono-Kote test material contained in the aluminum pans was determined by noting the volume of water required to fill pan to the very top edge of the pan. Fifty (50) cubic centimeters were arbitrarily added to this noted volume since Mono-Kote material protruded slightly above the top edge of the aluminum pan. Weight of Mono-Kote test material determined by subtracting empty aluminum pan weight from combined weight of pan and Mono-Kote. Density of Mono-Kote calculated from this volume and weight values.

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CONSTANT DATA

BOYLE ENGINEERING LABORATORY

Division of Rotherm Engineering Company Inc.
7280 W. Devon Ave. Chicago 31, Illinois

Title TEST OF ZOWLITE "MONO-KOTE"

Data Sheet No. 1

MATERIAL EXPOSED TO HIGH

Test No. 8525

VELOCITY AIR STREAM.

Date JAN 16 1961

WEIGHT OF MONO-KOTE SAMPLES @ START OF TEST.

SAMPLE #1 - 1488.4 GRAMS

SAMPLE #2 - 1456.2 GRAMS

SAMPLE #3 - 1492.0 GRAMS.

NOTE: SAMPLES WERE PLACED IN OVEN AT
180° FOR PERIOD OF 6 HRS. TO
DRY SAMPLES BEFORE ABOVE WEIGHT WAS
NOTED.

ALL SAMPLES WERE EXPOSED TO AN AIR
VELOCITY OF 104.8 M.P.H. (75°F). DIRECTION
OF AIR WAS PARALLEL TO MONO-KOTE SURFACE.
TOTAL EXPOSURE TIME 87 HOURS.

WEIGHT OF MONO-KOTE SAMPLES @ END OF 87 HOUR

EXPOSURE TO 104.8 M.P.H. AIR VELOCITY.

SAMPLE #1 - 1488.6 GRAMS

SAMPLE #2 - 1456.8 GRAMS

SAMPLE #3 - 1491.8 GRAMS

NOTE: SAMPLES AIR DRIED AT 115°F
FOR 7 HRS.

RESULTS: NO LOSS IN WEIGHT OF
MONO-KOTE SAMPLES FOR
87 HOUR EXPOSURE TO 104.8 M.P.H. VEL.
PA-86-4

CONSTANT DATA

BOYLE ENGINEERING LABORATORY

Division of Rotherm Engineering Company Inc.
7280 W. Devon Ave. Chicago 31, Illinois

Title TEST OF ZONOLITE MONO-KITE

Data Sheet No. 2

MATERIAL EXPOSED TO HIGH

Test No. 8528

VELOCITY AIR STREAM

Date JUN 16 1964

TEST DATA

BAR PRESS. = 29.25" Hg

DRY BULB TEMP. = 79°F

WET BULB TEMP. = 51°F

DENSITY = 0.0713 #/ft³

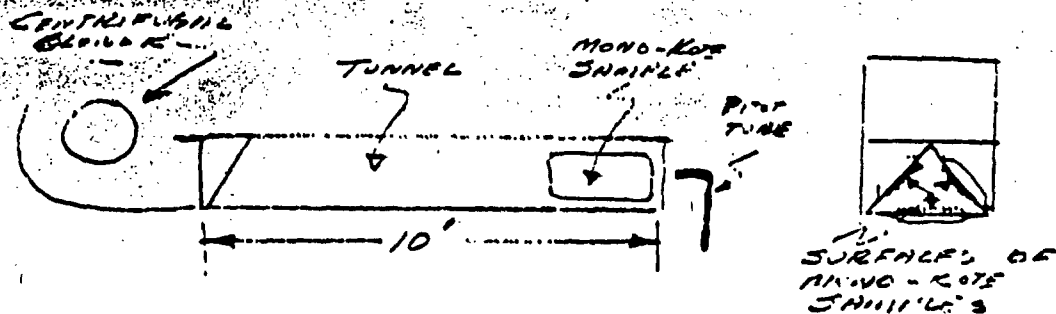
AVERAGE VELOCITY PRESS. = 5.05 in. H₂O

AIR VELOCITY = 1096 $\sqrt{\frac{5.05}{0.075}} \times 1.02 = 7200$ ft/min

1.02 = CORRECTION FACTOR FOR DENSITY OF AIR

W.P.H. = 7200 ft/min $\times$ 60 = 432000 ft/hr

TEST SET UP



SIZE OF EACH MONO-KITE SAMPLE CONTAINED IN AN FILUM. PAN (APPROX) 10 1/2" x 15 1/2" x 3/4"

CONSTANT DATA

BOYLE ENGINEERING LABORATORY

Division of Rotherm Engineering Company Inc.
7280 W. Devon Ave. Chicago 31, Illinois

Title TEST OF ZONOLITE "MONO-KOTE"
MATERIAL EXPOSED TO HIGH
VELOCITY AIR STREAM

Data Sheet No. 3
Test No. 8528
Date 4-30-64

DENSITY CALCULATION

WEIGHT OF ALUM PAN. = 460.7 GRAMS

AVERAGE WT. OF MONO-KOTE MATERIAL
CONTAINED IN ALUM. PAN. 1018.3 GRAMS

SAMPLE #1 1488.4 GRAMS
-460.7
1027.7 WT. OF MONO-KOTE

SAMPLE #2 1456.5 GRAMS
-460.7
995.8 WT. OF MONO-KOTE

SAMPLE #3 1492.0
-460.7
1031.3 WT. OF MONO-KOTE

AV. MONO-KOTE WT. = $\frac{1027.7 + 995.8 + 1031.3}{3} = \underline{1018.3}$

VOLUME OF ALUM PAN = 2300 CC + 50 = 2350 CC

DENSITY = $\frac{1018.3}{2350} = 0.43$ GRAMS/CC.

$0.43 \times 62.43 = 26.84$ LB/FT³ ← DENSITY OF MONO-KOTE