

WRG 001314

DEFENDANT'S



FROEHLING & ROBERTSON, INC.
INSPECTION ENGINEERS • CHEMISTS • BACTERIOLOGISTS
CABLE ADDRESS - "FROEHLING"

1681
GN 6712-9
Report No. 1

SEARCH LABORATORIES
ANALYTICAL DIVISION
BIOLOGICAL DIVISION
TOXICOLOGY DIVISION

UNCLAS AD



REPORT OF
TEST OF SPRAYED ON FIRE PROTECTION
TYPE MK
FOR RESISTANCE TO CRACKING, FLAKING, AND DELAMINATION
UNDER 240 FOOT-POUND IMPACT

Made For
ZONOLITE DIVISION
W. R. GRACE & COMPANY

By
Froehling & Robertson, Inc., Greenville, S. C.
September, 1965

Madison H. Woodward, RE 490, S. C.
Branch Manager

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Abstract

The test was performed on type MK fireproofing composition manufactured by ZONOLITE DIVISION of W. R. GRACE & COMPANY at Travelers Rest, South Carolina. The composition had been applied by field type equipment and methods to a 2.0' x 8.0' section of H. H. Robertson 18ga/16ga MK steel deck at a thickness of 0.75 inches. The steel section had previously received 2.5 inches (measured from top of flutes) of 3000 PSI structural concrete, which was placed seven days prior to application of the sprayed MK. After a normal curing period of the MK application, the impact test was performed as herein-after described.

Applicable Specifications

The test was performed in accordance with the Government Services Administration Specifications 65-17203, requirements For Sprayed Fire Protection, which reads as follows:

"Bond Impact Test: ASTM E-72, Impact test on specimens tested horizontally. Specimen shall be a completed floor assembly 2-feet wide by 8-feet long and supported. A 60-pound sand bag dropped from a height of four feet on the test specimen shall not crack or delaminate the acoustical plaster material from the surface to which it is applied."

Preparation of Test Specimen

A section of H. H. Robertson MK steel deck 18ga/16ga.

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2.0 feet wide by 14.0 feet long was suspended over firm supports with a clear span of 8.0 feet. Forms were set on top of the deck and structural concrete, as described below, was placed, vibrated and finished to a thickness 2.5 inches thick over tops of the flutes. The concrete was placed July 2, 1955.

Design mix of structural concrete:

28-Day Compressive Strength,	3000 PSI
Portland Cement Type I Per C. V.	420 lbs
Blacksburg Crushed Stone 1" to no. 4	1000 lbs
Washed Sand No. 4 to No. 100	1200 lbs
Water Total	33.0 gallons
Entrained Air	6% - 5%

On July 9, 1955 after 7-days curing of the structural concrete deck the MK was applied as follows:

Two bags of dry MK were mixed with water at the rate of 11.0 gallons per bag. Mixing was done in a conventional 6-S mortar mixer for a period of three to five minutes. The mixed material was placed in the hopper of a STADI-250 TRICONTAM piston type plaster pump and sprayed on to the underside of the test panel at the rate of 1.0 cubic feet per minute. Spraying was done in two coats of approximately 3/8" each, both courses following the contour of the steel. There was a lapse of time between courses of about 2.5 hours. Slight touch-up by trowel was necessary after spraying. Specimens of the same batch of MK were prepared for tests for density. The application made July 9 was made inside a steel building at daytime room temperature of 88° F. The completed panel was left in place

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to cure until September 9, 1965.

The dry density of the mix was tested and found to be 24.0 pounds per cubic feet on September 9, 1965.

Impact Test of Specimen

Prior to impact testing the completed panel, suspended between supports with a clear span of 8.0 feet, was closely examined with a magnifying glass for cracking, flaking, and delamination. A sand bag, fabricated in accordance with requirements of ASTM Spec. E-72, containing 60-pounds of sand, was suspended over the center of the panel so that the bottom of the sand bag was precisely 40.0 inches above the top of the specimen. The loaded sand bag was then instantaneously released and allowed to strike the test panel. The panel was then closely examined with a magnifying glass and no trace of flaking, cracking, or delamination of the MK material could be found. The test panel showed no effects whatever from the impact.

Conclusion

Results of the test showed that the MK material meets requirements of GSA Specification 65-17206 for Bond Impact Test.

Respectfully submitted,

FROMMLING & ROBERTSON, INC.

Madison H. Woodward

Madison H. Woodward, Manager

GRACE

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SURFACE-HARDNESS AND DENSITY OF ZONOLITE
MONO-KOTE SPRAYED FIREPROOFING

September 17, 1965

Test Report No. 1219

Laboratory Data Book No. 72, pp, 86, 119, 120, 123 & 129

Work done by: Ralph J. Bragg

Work requested by: M. Malter

Abstract: Surface hardness of a granular type sprayed fire-proofing material such as Zonolite's Mono-Kote is over 400 psi.

Data:

Type of
Material
Tested

Specimen
Density
(pcf)

Pressure Required
to Force:
1/20 sq. in. Flat
Plunger 1/4 in.
into Specimen

Mono-Kote

23.2

414 psi

Respectfully submitted,

Ralph J. Bragg
R. J. Bragg

Approved:

E. L. Perrine
E. L. Perrine
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Skokie Laboratory