

CONFIDENTIAL

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CAMBRIDGE

PLAINTIFF'S
EXHIBIT

WRG-691

TO: H. C. Duecker
DATE: November 27, 1972
FROM: R. J. Bragg
SUBJECT: AP, MK-1 and MK-3
CC: A. M. Rosenberg
C. E. Parker
L. S. Shu

This is a history of R/D activity in the sprayed cementitious products area, specifically covering W. R. Grace's Acoustical Plastic and MONO-KOTE[®] materials. Appendix A lists the four following formulae:

ACOUSTICAL PLASTIC[®]
MONO-KOTE, MK-1
SPRA-INSULATION[®]
MONO-KOTE, MK-3

Comparison of Products

ACOUSTICAL PLASTIC is quite an old product, having been sold as early as the mid-forties. It originally was applied only by trowel, but with the advent of plastering pumps in the fifties was easily spray applied. AP contains a relatively high percentile of expanded vermiculite. The binder is colloidal bentonite, also termed sodium bentonite or Wyoming Type bentonite. This grade in aqueous systems has a high swelling potential, absorbing 3 to 4 times its weight of water. Because of this property, bentonite is a relatively efficient binder for sound absorbing matrices since on drying the binder shrinks to original size, leaving interconnecting interstices in the body of the product. These are instrumental in dissipation of sound.

Asbestos in AP contributes to mixing uniformity, water holding capacity (high yield) and improved pumpability. Duponal WA Dry (sodium lauryl sulfate) is an air entraining agent; Dowicide G a fungicide, and sodium nitrite acts to improve bond to certain metal substrates.

AP served a dual role in Zonolite's product line, i.e., a combination sound absorbing and fireproofing membrane. For many years, AP alone or in combination with vermiculite plasters constituted the hand and machine applied fireproofing materials of the Zonolite company.

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MONO-KOTE, MK-1 replaced ACOUSTICAL PLASTIC in most of the fireproofing applications. It was judged in UL comparison fire testing to be equivalent to AP on an equal thickness basis. Also, it was preferred from an application standpoint because of speed of application. AP requires many days of drying to build up adequate thickness. It shrinks during drying, opening fissures in the exposed surface. MK-1 is a setting type of material, permitting double-back coatings to be applied within hours of the initial coat.

MK-1 utilizes a three component cement-resinous binder system, comprising alpha gypsum, portland cement and spray dried polyvinyl alcohol. The latter ingredient also functions as an efficient air entrainment agent, producing relatively low density material.

MK-1 was originally submitted by R. Sefton as an acoustical plaster, not as a sprayed fireproofing compound. Sefton had no pumping or spraying equipment and prepared his specimens in a laboratory mixer and applied them with a trowel. As a result, the original materials had low cured densities and good sound absorption. Zonolite decided to determine what effects pumping and spraying had - product was considerably densified - and subsequent pilot fire testing indicated this material was an efficient fireproofing membrane.

SPRA INSULATION is MK-1 with slightly more aggregate. It's primary use was for spray applied ambient insulation for thermal insulation and condensation control of metal buildings.

MONO-KOTE, MK-3 development was begun December 27, 1960. The relatively high cost of MK-1 compared with other fireproofing products then on the market created the desire for a new, economical product. The first experiment in the program is recorded in Zonolite Lab Notebook 68, page 127. To assist us, J. A. Kelley, then president of Zonolite, procured a guide formula listing four ingredients (expanded perlite, stucco, asbestos and Monad G). We were not familiar with Monad G, but suspected it was an air entrainment agent and substituted sodium lauryl sulfate. Years after MK-3 had been commercial, we found Monad G, a product of Colgate-Palmolive Company was a sulfated monoglyceride of coconut oil, anionic and, indeed, was an air entrainment agent.

Concerning the similarities or differences between MK-1 and MK-3, they each comprise four basic ingredients as:

Aggregate,
Binder,
Fiber,
Air Entrainment Agent.

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In both products the aggregate is expanded vermiculite, a lesser quantity being used in MK-3. The range of density and sizes of vermiculites permitted in MK-3 is quite broad compared with that of MK-1.

Major differences between MK-1 and MK-3 exist in the binder system. MK-1 utilized a three component cement-resinous system of alpha gypsum, white portland cement and spray-dried polyvinyl alcohol. Claims are made for this combination in U. S. Patent No. 3,042,681 (Appendix B) awarded July 3, 1962 to Robert C. Sefton, assigned to Steel City Industries, Inc.

The binder of MK-3 is a single component beta gypsum. It differs in crystal form, consistency and compressive strength from the alpha gypsum specified in the patent. White portland cement and spray-dried polyvinyl alcohol are not used in MK-3. Basic change then is that we eliminated the three most expensive ingredients and are using a different form of gypsum.

The fiber in both materials is the same, with the exception that through the years of manufacturing MK-3 we have been selective about asbestos to the point we use grades which improve yield up to 10% over yields obtained with the unrefined asbestos in MK-1.

Since polyvinyl alcohol is an efficient AEA and since it is not incorporated in MK-3, we have added E. I. du Pont's Duponal WA Dry, a 45% active sodium lauryl sulfate at the level of 0.14 wt. %.

Chronological history of the R&D activity during the transition from MK-1 to MK-3 is listed in Appendix C. Data contained are derived from three sources:

Zonolite Laboratory Notebooks,
Zonolite Internal Test Reports,
Outside Laboratories Test Reports..

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Patent Considerations

The awarding of U. S. #3,042,681 occurred 2 or 3 months after MK-3 went commercial. There may have been some discussions between Mr. Sefton and Zonolite personnel between mid-1959 and award date of mid-1962 which bore on the claims of the patent, but I have no direct knowledge of such discussions.

We did not file disclosures or patent applications on the MK-3 composition. There were several formal discussions on this subject, but all of us (J. A. Kelley, R. W. Sterrett, E. L. Perrine, M. G. Quayle, R. J. Bragg) believed prior art existed in the form of products like United States Gypsum Company's "FIRE CODE" and National Gypsum Company's "FIRE SHIELD". We did not consider MK-1 to constitute prior art.

During 1968, National Gypsum Co. notified us that MK-3 infringed one of their patents. At this time we license MK-3 under the National patent. To my knowledge, National has not cited MK-1 for infringement.

Ralph J. Bragg
Ralph J. Bragg

RJB:mlr

Attachments (Appendix A, B & C)

C O N F I D E N T I A L

H. C. Duecker

(attachment)

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APPENDIX A

Wt. %

ACOUSTICAL PLASTIC (Bermuda Tan)

No. 2 Screened Expanded Vermiculite (5 PCF)	61.68
Asbestos 7M Fiber	18.69
Bentonite	18.69
DuPontal WA Dry	0.12
Dowicide G	0.29
Sodium Nitrite	0.67

MONO-KOTE, MK-1

No. 3 Screened Expanded Vermiculite (5.62 PCF)	40.49
Asbestos 7M Fiber	12.42
White Portland Cement	8.32
Alpha Gypsum	37.26
Dowicide G	0.24
Polyvinyl Alcohol - Spray Dried	1.24

SPRA-INSULATION

No. 3 Screened Expanded Vermiculite (5.62 PCF)	42.90
Asbestos 7M Fiber	11.90
White Portland Cement	7.98
Alpha Gypsum	35.75
Dowicide G	0.23
Polyvinyl Alcohol - Spray Dried	1.19

MONO-KOTE, MK-3

No. 3 or 4 Expanded Vermiculite (4.5-8 PCF)	28.73
Beta Gypsum	58.55
Asbestos 7M Fiber	12.58
DuPontal WA Dry	0.14

R. J. Bragg
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