UV.0001 # 2

STATUS REPORT

RIGID FOAMS, NEW RAW MATERIALS, EXPLORATORY

POWDERED ASBESTOS AS A RIGID FOAM FILLER

ORIGINAL COPY

Authors: E. F. Cox
W. C. Kuryla

Date: May 21, 1965

Project No.: 127G16

File No.: 4095

SUMMARY No improvements in rigid foam properties were observed as a result of incorporating a powdered asbestos filler into NIAX Foam System T-248/T-600. The foam compression properties were severely degraded at a 10 phr asbestos level, and the asbestos filler did not improve flammability properties.

Differences in asbestos-resin mixing methods, wherein a high shear 3-roll paint mill was compared with a low shear laboratory stirrer, were not observed in the properties of the foams made with each of these respective solid-resin mixtures.

While the present study is somewhat disappointing in its findings, work now underway with other solid fillers such as zinc borate may be more encouraging and will be reported in the near future.

INTRODUCTION One of the objects of this study was to determine the effect of an asbestos filler on rigid foam properties. Another was to determine what effect the nature of the mixing process (i.e., mixing the asbestos into the polyol system), would have on the foam properties. In the latter study a low shear air-driven laboratory stirrer was compared with a high shear 3-roll paint mill.

Previous studies in the area of powdered fillers in rigid polyurethane foams include the work of Kessell and James[1], who found that inert fillers did not improve the shear modulus properties of the rigid foams under study. These workers also observed that powdered fillers depressed the compressive strength properties of foams, which is in accord with the findings of the present study.

---

(1) F. Hostettler, W. R. Proops, E. L. Kessel, R. VanCleve, R. H. Harding, and B. F. James, "Polyurethanes: Rigid Foam Application and Evaluation; Influence of Powdered Fillers on Modulus of Rigidity", Research Dept. Project Report, May 1, 1961.

Research and Development Department
Chemicals Division
Union Carbide Corporation

PLAINTIFF'S EXHIBIT

UC-4762

DISCUSSION In the coatings field there is considerable evidence which indicates the necessity of a high shear mixing process (i.e., mixing certain solids into a paint system), for the realization of optimum coating properties. It was of interest to ascertain whether or not an improvement in rigid foam properties would be obtained by the high shear mixing of asbestos powder into the polyol side of a foaming system.

The data of Table I indicates that, in the T-248/T-600 system of the present study, there is no signficant difference between the low and high shear mixing techniques. Furthermore, the data strongly indicates that there is nothing to be gained in foam properties with the use of asbestos powder as a filler. In fact, the foam compression properties rapidly degrade with increasing amounts of filler. Likewise, no improvement is indicated in the flammability properties of asbestos containing foams.

The foam system used in this study was NIAX Resin T-248 (80 parts of BE-320, 16 parts of RO-350, 4 parts KM-1, 26 parts of U-11B, and 1.0 parts of propylene oxide), and NIAX Activator T-600 (98.5 parts of PAPI and 1.5 parts of Silicone L-5310). The procedure used for mixing the asbestos powder into the resin is described in the Experimental section. The powdered asbestos filler was obtained from Mr. N. J. Setter of the Mining and Metals Division (High Purity No. 7 Grade, Chrysotile asbestos).

While the present study is somewhat disappointing in its findings, work now underway with other solid fillers such as zinc borate may be more encouraging in that higher levels of additive do not severely depress the compression properties of the foams having the filler incorporated therein. This work will be reported in the near future.

EXPERIMENTAL

Low Shear Mixing

The asbestos powder was mixed into the T-248 resin system using an air driven laboratory stirrer, over a 1 to 2 minute time period. The fluorocarbon which had volitilized was then re-added, and the T-248/asbestos mixture foamed in a standard manner using T-600 as the activator in the following formulation.

	Formulation
T-248 Resin	127 parts
T-52N Catalyst	1.0 parts
U-11B	13 parts
T-600 Activator	82 parts
Asbestos Filler	Indicated in Table I

High Shear Mixing

The asbestos powder was first mixed into the T-248 resin system by the use of a bread dough mixer, and stirred for a period of 5 minutes. This "pre-mix" was then passed three times through a 3-roll paint mill, over about a 2-1/2-hour period. The fluorocarbon which had been volitilized during this processing was then re-added, and the T-248/asbestos mixture foamed in exactly the same manner as described above.

Experimental Discussion

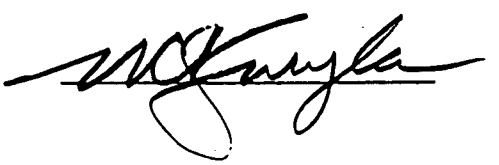
The mixing of asbestos powder into a T-248 resin system at the 5 phr level (parts per 100 parts of polyol blend) gave no particular difficulty in either the actual mixing operation or subsequent foaming of the mixture. However, at higher additive levels the mixtures were increasingly more viscous, and, in fact, mixtures containing 15 phr asbestos were semi-solid in consistancy. These 15 phr mixtures were extremely difficult to foam and a good mixing of activator with the mixture could not be accomplished.

The asbestos-containing foams were all friable or "punky", this property being generally proportional to increasing asbestos content and reflected in the compression properties of the foam (Table I).

Additional work is planned for hydrophobic and chemically modified asbestos for use as fillers in rigid foams.

NOTEBOOK REFERENCE: 8WCK-21

ATTACHMENT: 1 Table



my

Union Carbide trial exhibit UC-4762: E. F. Cox and W. C. Kuryla Status Report on Powdered Asbestos as a Rigid F...
ACL Doc 19285 · Page 4 of 5

TABLE I

PHYSICAL PROPERTIES OF ASBESTOS CONTAINING FOAMS

(SYSTEM = T-248/T-600)

Asbestos Content (PHR)	0	5**	5*	10**	10*
Foaming Data:					
Cream Time (sec.)	30	28	30	28	30
Rise Time (sec.)	140	110	135	115	115
Tack Free Time (sec.)	105	90	90	90	85
Properties Data:					
Appearance	122.	122.	122.	123.	123.
Core Density PCF	1.65	1.60	1.77	1.81	2.03
Closed Cells PCT	87.	85.	87.	70.	82.
Cell Volume .0001 cc.	0.0	0.0	0.0	0.0	0.0
Compressive Strength					
25C PSI PARL	33.	20.	24.	7.	10.
PERP	8.	7.	8.	4.	6.
100C PSI PARL	25.	14.	18.	5.	11.
PERP	9.	9.	11.	0.	10.
Retention PCT	92.	101.	109.	0.	140.
Cold Aged PSI	0.	19.	23.	6.	10.
Dry Aged PSI	38.	18.	21.	21.	12.
Humid Aged PSI	20.	10.	13.	4.	8.
Cold Aging PCT Change					
Weight 14 Days	-9.6	-11.5	-9.0	-9.2	-8.2
Volume 2 Days	0.	0.	0.	0.	0.
14 Days	-49.	-23.	1.	-3.	1.
Dry Aging PCT Change					
Weight 14 Days	2.0	0.6	1.1	-6.6	0.7
Volume 14 Days	8.	10.	9.	19.	7.
Humid Aging PCT Change					
Weight 7 Days	0.0	0.9	5.3	-8.2	41.1
14 Days	-0.6	1.2	10.4	-8.7	-0.2
28 Days	0.3	7.0	1.1	-9.2	-2.1
Volume					
7 Days	34.	32.	23.	21.	19.
14 Days	44.	38.	27.	21.	22.
28 Days	47.	41.	33.	20.	21.
Flammability ASTM D1692					
Density PCF	1.60	1.52	1.68	1.82	1.95
Ignition Time, Sec.	15.	12.	13.	12.	12.
Extinguish Time, Sec.	33.	33.	31.	34.	37.
Burning Extent In.	1.2	1.3	1.2	1.2	1.4
Burning Rate In/Min	0.0	0.0	0.0	0.0	0.0

* Low Shear Mixing
** High Shear Mixing

Published by AsbestosClaims.Law
asbestosclaims.law/library/19285/4

DISTRIBUTION

Mr. P. D. Berry, 511
Dr. R. H. Harding, 511
Mr. C. J. Hilado, 511
Dr. R. J. Knopf, 511
Dr. W. M. Lanham, 511
Dr. D. G. Leis, NYO
Mr. J. W. Locher, NYO
Mr. M. M. Maupin, NYO
Mr. R. W. McLaughlin, 511
Mr. C. D. Neil, TNY
Dr. W. R. Proops, 511
Mr. N. J. Setter, M and M Div., Tuxedo, N. Y.
Dr. W. N. Stoops, 511
Information Retreival
Authors (2)

Published by AsbestosClaims.Law
asbestosclaims.law/library/19285/5