UJ-0001 #24

STATUS REPORT

PLAINTIFF'S EXHIBIT

UC-4763

RIGID FOAMS, NEW RAW MATERIALS, EXPLORATORY:

"HYDROPHOBIC" ASBESTOS AS A RIGID FOAM FILLER

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SUMMARY Improvements in rigid foam properties were not observed as a result of incorporating a "hydrophobic" asbestos filler into NIAX Foam System T-248/T-600. The foam compression properties were severely degraded at a 10 parts "H"-asbestos level, and the filler did not improve either the flammability or shear properties.

Because of these results, and the findings of past studies which have clearly demonstrated the property-degratory effect of an asbestos filler, it is recommended that no further work be done with asbestos-based fillers in rigid polyurethane foams.

INTRODUCTION As part of the continuing program to investigate promising but inexpensive fillers in polyurethane rigid foams, "hydrophobic" asbestos powder was examined as an inert additive in NIAX Foam System T-248/T-600. A previous study[1] showed that asbestos powder, when incorporated into this foam system as an inert additive, not only severely degraded the compressive properties of the foams but failed to show any improvement in flammability properties as well.

It was felt by Mr. N. J. Setter of our Mining and Metals Division[2] that an asbestos which was chemically modified by its reaction with 10 wt.% stearic acid, and thereby rendered hydrophobic, would be significantly different in its chemical behavior to warrant its investigation as a rigid foam filler.

DISCUSSION Experimental:

A quantity of "hydrophobic" asbestos, which contained about 10 weight percent combined stearic acid, was

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received from Mr. N. J. Setter. This material was mixed into a T-248 Resin using an air-driven laboratory stirrer in levels of 5, 10, and 15 parts, just prior to foaming. The foaming of these resin-filler mixtures was done by the standard laboratory hand-batch technique, using open cardboard molds. Resin-filler mixtures which contained 15 parts of filler could not be successfully foamed due to the unworkably high viscosity of these mixtures.

Foam Results:

The "hydrophobic" asbestos-containing foams were all somewhat friable or "punky", but not to the same degree as those foams which contained the untreated asbestos(1).

The data of Table I indicate that, in the T-248/T-600 system of the present study, there is nothing to be gained in foam properties with the use of "hydrophobic" asbestos as a filler. The foam compression and shear properties rapidly degrade with increasing filler concentration. Likewise, no improvement is indicated in the flammability properties of "hydrophobic" asbestos-containing foams.

These findings are in full accord with those of a previous study whereby untreated asbestos was used as a filler(1); and are in general agreement with the work of Kessell and James(3), who found that inert fillers did not improve the shear modulus properties of the rigid foam systems under study.

CONCLUSIONS Because of the results of the present investigation, and the findings of past studies which have clearly demonstrated the property-degratory effect of an asbestos filler, it is recommended that no further work be done with asbestos-based fillers in rigid polyurethane foams.

BIBLIOGRAPHY

(1) E. F. Cox and W. C. Kuryla, "Rigid Foams, New Raw Materials, Exploratory: Powdered Asbestos As A Rigid Foam Filler", Status Report, File No. 4095, May 21, 1965.

(2) Letter from N. J. Setter (Mining and Metals Division, U.C.C.), to Dr. E. F. Cox, June 1, 1965.

(3) 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.

Notebook Reference: 8WCK-69, 73

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Attachments: Table 1

TABLE I

PHYSICAL PROPERTIES OF FOAMS CONTAINING "HYDROPHOBIC" ASBESTOS

(SYSTEM = T-248/T-600)

Formulation (Parts):						
"Hydrophobic" Asbestos	0	5	10	0	5	10
T-248	127	127	127	127	127	127
T-600	82	82	82	82	82	82
T-52N	0.6	0.6	0.6	0.8	0.8	0.8
U-11B	8	8	8	13	13	13
Foaming Data:						
Cream Time, Sec.	30	40	60	30	30	30
Rise Time, Sec.	250	190	140	120	140	120
Tack-Free Time, Sec.	170	140	140	125	100	90
Foam Properties:						
Appearance	122.	122.	122.	121.	121.	122.
Core Density PCF	2.01	2.17	2.18	1.70	1.75	1.80
Closed Cells PCT	90.	90.	87.	92.	88.	88.
Compressive Strength						
25C PSI Parl	44.	23.	14.	31.	21.	14.
Perp	20.	13.	9.	11.	9.	9.
Cold Aged psi	37.	27.	14.	-	22.	14.
Dry Aged psi	49.	26.	13.	34.	18.	12.
Humid Aged psi	23.	17.	9.	15.	12.	10.
Cold Aging pct Change						
Weight 14 Days	-5.0	-1.7	-7.3	-10.2	-8.4	-7.8
Volume						
14 Days	-16.	1.	2.	-38.	1.	2.
Dry Aging pct Change						
Weight 14 Days	0.9	0.2	-3.0	1.1	-3.5	-9.9
Volume 14 Days	3.	3.	4.	10.	8.	1.
Humid Aging PCT Change						
Weight 7 Days	4.8	5.0	3.5	-0.8	-1.1	-4.1
14 Days	2.9	7.0	4.1	0.8	0.0	-2.8
28 Days	4.0	9.6	17.8	-2.4	-4.0	-8.2
Volume						
7 Days	20.	13.	14.	35.	31.	30.
14 Days	29.	17.	20.	50.	34.	26.
28 Days	38.	23.	21.	62.	28.	23.
Flammability ASTM D1692						
Density PCF	1.93	2.10	2.06	1.70	1.75	1.80
Ignition Time Sec.	14.	16.	15.	15.	12.	14.
Extinguish Time Sec	39.	43.	39.	40.	34.	38.
Burning Extent In	1.1	1.0	1.2	1.0	1.1	1.2
Burning Rate In/Min						
Flammability ASTM E162						
Density PCF	2.09	2.25	2.22	-	-	-
Flame Spread Factor	36.7	41.8	37.0	-	-	-
Heat Evol. Factor	10.9	14.4	11.5	-	-	-
Flame Spread Index	399.	639.	426.	-	-	-
Burning Extent In.	15.0	15.0	15.0	-	-	-
Flame Penetration Test						
Density PCF	2.08	2.31	2.27	1.78	1.80	1.90
Penetr. Time Sec.	34.	23.	51.	26.	16.	22.
Weight Loss PCT.	13.8	8.8	12.3	13.2	11.3	20.8
Shear 25C 2. in PARL						
Density, PCF	2.01	2.19	2.22	-	-	-
Strength, psi	25.	13.	12.	-	-	-
Modulus, psi	271.	231.	267.	-	-	-
Shear 25C .5 in PARL						
Density, PCF	1.90	2.12	2.11	-	-	-
Strength, psi	33.	21.	14.	-	-	-
Modulus, psi	534.	593.	439.	-	-	-
Foam Ref., 8WCK-	73-1	73-2	73-3	69-1	69-2	69-3

Proj. No. 127G16

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