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UNION CARBIDE

INTERNAL CORRESPONDENCE

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APPROVAL
SOUTH CHARLESTON 3, WEST VIRGINIA
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UNION CARBIDE CHEMICALS COMPANY

To (Name)	Dr. C. K. Fink, TNY	Date	March 2, 1962
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	Dr. W. J. Tapp (2), 511		
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Gentlemen:

In the recent report by W. C. Kuryla and D. G. Leis Fibrous Fillers in Flexible Urethane Foams February 23, 1962; File No. 69H-S109, in the final paragraph of the first page, Dr. Tapp was quoted that "...the references to negate the patentability...". Dr. Tapp has called to my attention that this implied the expression of a legal opinion which he is not qualified to provide.

What was intended, in good faith, was to state that Dr. Tapp recommended that the prior art was such that it would be difficult if not impossible to distinguish the reinforced foam as a novel composition of matter over the published literature. For this reason the invention disclosure was not submitted to the Patent Department.

Very truly yours,

W. C. Kuryla

WCK/ras

STATUS REPORT

Formal

FOR

FIBROUS FILLERS IN FLEXIBLE URETHANE FOAMS

AUTHORS: W. C. Kuryla

D. G. Leis,
Group Leader

DATE: February 23, 1962

FILE NO: 69H-S 109

Project No: 2560A

SUMMARY Flexible and semi-flexible polyurethane hand-foams with fibrous fillers incorporated therein will support a greater load than control foams containing no fillers. The greatest increase of load-bearing (I.L.D.) in flexible foams was observed with fiber glass. In the future an attempt will be made to foam a polyol-fiber glass slurry with the Hennecke UB-52 machine when a pump suitable for pumping such a slurry can be located.

DISCUSSION High load-bearing flexible polyurethane foam is of commercial importance since the foam is sold by board-foot and graded by the load-bearing ability. One way to achieve such a foam is to incorporate reinforcing fibers into the foamed polymer structure.

The fibrous fillers were incorporated into the foam by first premixing into the polyol and then hand-foaming the polyol-fiber mixture in the usual manner. Fibers used in the present work include glass fiber, asbestos fiber, cotton linters, and DYNEL (chopped) staple fiber.

The greatest increase of load-bearing ability (I.L.D.) in flexible foams was observed with fiber glass. This result is in accord with the fact the strength-to-weight ratio for fiber glass is unequalled by any other material, provided the surface of the fiber has not been abraded (1). The data for the laboratory hand foams having fibrous fillers incorporated therein are presented in Table I.

The literature gives some reference to the incorporation of fiber glass into prepolymer and polyester urethane systems (3), (4), (5) but an example of fiber glass into a "one-shot" flexible foam system seemed lacking. An invention disclosure (61-CD-15) was then written. A short time after the writing of this disclosure reference (2) was found. Dr. W. J. Tapp of this Department then reviewed all the references cited and decided that enough prior art was present in these references to negate the patentability of fiber glass in reinforced "one-shot" flexible foams. The invention disclosure was declared inactive, and not sent to the Patent Department.

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It is strongly felt that flexible foams having unusually high load-bearing properties could be made with a foam machine, provided a pump suitable for pumping a polyol-fiber glass slurry can be found. The cost of fiber glass, as "milled" 1/4 in. fibers, is of the order of 40-45 cents per pound. Thus, the inclusion of a few parts fiber glass per 100 parts polyol in a flexible or semi-flexible foam formulation would not be economically out of the question. Such high load foams might find utility in packaging and other specialty applications.

EXPERIMENTAL The fibrous filler was first premixed into the polyol and the polyol-fiber mixture hand foamed using the formulation below. All foams were then oven cured at 140°C for 15 minutes immediately after foaming.

Formulation

Polyol (NIAX triol LG-56)	100 g.
Silicone Oil L-520	1.0 g.
Water	3.5 g.
Tetramethyl-1,3-butanediamine	0.10 g.
Tolylene diisocyanate	3% excess
Stannous octoate	0.30 g.
Fibrous filler	Varied (Table I)

BIBLIOGRAPHY

(1) Green, C. H., "Glass", Scientific American, 204, 92 (1961).

(2) News Item, Rubber World, 138, 417 (1958).

(3) Moroni, R., German Patent 939,404, Feb. 23, 1956: Chem. Abs., 52, P13,303f (1958).

(4) United Aircraft Corp., British Patent 712,408, July 21, 1954: Chem. Abs., 49, P4443b (1955).

(5) Velatex, N. V., Dutch Patent 70,960, October 15, 1952: Chem. Abs., 47, P5158b (1953).

NOTEBOOK REFERENCE: D-4333-47, 62, 67

LABORATORY ACCOUNT: 81717-06-3102

PERIOD: January 30, 1961 to August 8, 1961

Attachments:
1 Table

TABLE I

PHYSICAL PROPERTIES OF FIBER-CONTAINING FOAMS

Example No.	Fiber Filler, g./100 g Polyol	Rise Time (sec.)	Density (lbs./ft.^{3})	4" Load Deflection (I.L.D.) (lbs./50 in.^{2})			4" Flex Fatigue		Foam Evaluation
				25%	50%	65%	Load Loss (%)	Height Loss (%)	
1	"Fiberglas" (1/4"), 1.0	--	2.04	35.1	57.4	80.0	21.7	2.9	Good flexible foam
2	"Fiberglas" (1/4"), 5.0	--	2.16	40.7	69.8	102.0	21.4	3.2	Somewhat stiff flexible foam
3	"Fiberglas" (1/4"), 5.0	--	2.13	38.4	65.0	98.2	21.9	3.9	Somewhat stiff flexible foam
4	CONTROL, 0.0	--	2.06	34.0	54.6	75.5	21.2	2.9	Good flexible foam
5	"Fiberglas" (1/4"), 5.0	89	1.89	35.1	59.0	84.6	20.2	2.0	Somewhat stiff flexible foam
6	"Fiberglas" (1/4"), 10.0	114	--	--	--	--	--	--	Stiff flexible foam
7	"Fiberglas" (1/4"), 15.0	127	--	--	--	--	--	--	Very stiff flexible foam
8	CONTROL, 0.0	91	1.90	35.9	53.3	71.5	22.8	2.1	Good flexible foam
9	Cotton linters, 1.0	90	1.91	33.1	50.4	69.1	15.1	1.5	Good flexible foam
10	Cotton linters, 5.0	200	--	--	--	--	--	--	Stiff flexible foam
11	DYNEL (chopped), 0.50	98	1.82	26.1	43.1	59.9	15.7	2.2	Good flexible foam
12	DYNEL (chopped), 5.0	120	--	--	--	--	--	--	Good flexible foam
13	Asbestos, 1.0	93	1.88	38.2	56.9	76.9	14.7	1.7	Good flexible foam
14	Asbestos, 10.0	200	--	--	--	--	--	--	Stiff flexible foam

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DISTRIBUTION

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