



Industrial Products Co.

A division of Raybestos Manhattan Inc.

T-8/4

Textile Group

July 27, 1978 JUL 31 1978

Mr. L. L. Grubb
Aluminum Co. of America
1600 Harvard Avenue
Cleveland, Ohio 44105

Dear Mr. Grubb,

At the request of your Mr. Robert Carter in your Pittsburgh Office, we are pleased to enclose a copy of the McGill University tests of fibre release on three asbestos fabrics.

If we can be of further help, please let us know.

Sincerely,

Carlyle Singletary
Manager Marketing Service

ah

cc: Mr. Robert B. Carter ✓
Aluminum Co. of America
1501 Alcoa Bldg.
Pittsburgh, PA 15219

lcc
Koblar - 29 looks good - will send me later.
(To L. L. Grubb)
APC 8/1

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PLAINTIFF'S
EXHIBIT
AL-996

Introduction

During May and June 1975 laboratory tests of fibre release from 14 asbestos fabrics were conducted in our laboratories. This report concerns the test results for three fabrics which were part of the series tested and are reported separately at the request of Raybestos Manhattan Incorporated.

Materials

The three fabrics described in this report were:

Underwriters' brushed, Acrylic treated	L71-1133
Untreated	L71-1133
Plain wet brushed Acrylic treated	9P135N

Methods

a) The Testing Machine -

The system permitted the palm side of the fabricated mittens to be subjected to stresses produced by clapping and rubbing actions. The clapping speed and force as well as the rubbing time and frequency could be adjusted. The clapping action was achieved by means of pneumatic cylinders. The rubbing action took place on a smooth wooden board and rubbing was achieved by a combination of rotational movements of the hands and the board. The movements of the hands and board were controlled entirely pneumatically using a central compressed air supply, not from cylinders as illustrated.

The control system was based on a simple memory-chain type of 5-step programmer. The testing cycle was as follows:

- the hands clapped against each other once in the "off-board" position
- the hands separated
- the hands moved into "on-board" position
- the hands clapped once against the board, remained, and the rubbing action followed
- the hands separated and moved back to the "off-board" position.

The settings for this series of tests were adjusted so that the mittens were rubbed against the board 5 times every 10 seconds, and then brought together in a single clapping action. The rubbing action lasted 10 seconds.

b) Preparation of fabrics for testing - Asbestos fabrics were supplied in rolls by Raybestos Manhattan. For testing, the fabric was fashioned into "mittens" which would fit snugly over the hands of the machine. The "mittens" had an approximate surface area of 150 sq.in. with approximately 75 sq.in. in contact with the rubbing board during a test. The edges of the fabric which were cut by our laboratory were sealed with adhesive tape to prevent ragged ends from releasing dust during the tests.

c) Sampling - The degree of fibre release was assessed by measuring the fibre concentration at fixed points in the test chamber. For this purpose membrane filters (Millipore MAWP037A0, 0.8 micrometer pore size) were placed at a height of 12 inches above the "mittens" when in the vertical clapping position. Dust samples were taken in duplicate (the two membrane filters placed in close proximity to one another at the same height). The sampling sites were fixed and did not change throughout the testing program. The sampling rates at the two sampling points were 2.9 and 3.2 l/pm respectively and these flow rates were maintained using critical orifices and were checked during the testing program.

d) Counting - The Technician performing the counts had no knowledge of the fabric types under test. The membrane filters were mounted using the method recommended by the British Occupational Hygiene Society ⁽¹⁾ and counted at 400X magnification using phase contrast illumination on a Zeiss Research microscope. Fifty fibres or 100 fields were counted depending on which was reached first.

e) Test procedure - Details of the procedure adopted for all tests was as follows:

1. The clapping and rubbing cycle times, were established and remained the same for all tests.
2. The chamber was purged with filtered air which entered the chamber through millipore membrane filters (0.8 μ m) located near the top of the chamber. This purging took 10 minutes.
3. The machine was operated without "mittens" for 1 hour and an airborne sample of dust collected. This constituted the blank.
4. The chamber was opened, the filter from the "blank test" removed and the prepared mittens were placed on the hands. The chamber was closed and the machine set in operation for 1 hour. Samples of airborne dust were collected in duplicate during this test period. (First hour test sample)
5. At the end of the 1 hour period the chamber was purged as before (see No. 2).
6. The chamber was opened and the samples collected during the first hour test period were removed.
7. The chamber was closed and the machine operated with the same fabric in position for 2 hours.
8. At the end of this 2 hour period the chamber was purged as before (see No. 2).
9. The chamber was opened and 2 new membrane filters placed in position.

10. The machine was started with the same fabricated "mittens" in position and operated for 1 hour. Samples of airborne dust were collected in duplicate during this test period (Fourth hour test sample).
11. At the end of 1 hour the machine was turned off; the chamber purged with filtered air.
12. The chamber was opened and the filters and used gloves removed.
13. Steps 2 - 12 were repeated for all fabric tests.

Using the above procedure it was possible to determine the background fibre concentration in the chamber during the operation of the machine without fabric in position; to determine the concentration of fibre arising as the result of fabric abrasion during the first hour of the test and to determine the concentration arising as the result of fabric abrasion during the 4th hour i.e. after the fabric had been rubbed for 3 hours.

Results

The concentrations of fibre measured at the sampling positions during the first hour and fourth hour of the tests of the three fabrics L71-1133 Treated, L71-1133 Untreated and 9P135N treated are shown in Table I.

The following observations were made:

1. There appeared to be a reduction in the concentrations of fiber associated with acrylic treated fabrics (see L71-1133). This result was true in all comparison tests of the (acrylic treated and untreated) fabrics.
2. There was good agreement between the duplicate counts for the individual tests and between the test carried out on the same material at the beginning and end of the test program. In order to determine with some accuracy the degree of variation within the test program it will be necessary to repeat tests of all materials to examine the within fabric and between fabric variation in fibre release. In most cases the duplicate tests gave results within $\pm 20\%$ of the mean, which bearing in mind observer variation in counting, slight differences sampling rate and sampling position was reasonably acceptable, especially as the concentrations associated with tests of different fabrics differed by more than 200% in some cases.
3. There was a tendency for the concentration of fibers associated with the test during the fourth hour of rubbing to be lower than during the first hour of the test.

4. At the end of the tests period the fabrics exhibited varying degrees of wear. The fabric 9Pl35N was one of 3 of the 14 tested which developed a hole in one corner.

For comparison the ranges and median concentrations of fibre measured during tests of the 14 fabrics referred to above were as follows:

<u>First hour</u>		<u>4th hour</u>	
<u>Range</u>	<u>Median</u>	<u>Range</u>	<u>Median</u>
0.28-4.59	1.97	0.29-2.61	1.50

Limitations of the Test

- a) The degree of abrasion between the fabric and the board and between the fabric surfaces when clapped will depend on the surface properties of fabric. During the test it was noted that certain fabrics would tend to slow down the rub cycle slightly, probably due to increased friction with the surface of the fabric. This would also affect wear.
- b) There was some wear on the rubber of the hand of the machine resulting from the initial rub cycle when no fabric was placed on the hands. The similarity in results for the same fabric tested at the beginning and end of the test program indicated that the effect of this on the reproducibility of the test was negligible.
- c) The results of this test can be only used for comparing the fiber release during the first hour and the fourth hour of the rub cycle, and for comparing the fibre release between different fabrics. It should be noted that repeat tests on the sample fabric have only been carried out in two cases. Although these results were in good agreement further tests are needed to confirm reproducibility.
- d) The absolute concentrations of fibre given in this report were those obtained under the test conditions described. Extrapolation of these concentrations to situations in which manufactured products might be used are not valid and tests of fibre release using different test procedures may yield different concentrations.

Reference

1. Committee on Hygiene Standards. Hygiene standards for asbestos dust. Ann. Occup. Hyg. 11 47-69. 1968.

TABLE 1

AIRBORNE FIBRE CONCENTRATIONS RECORDED DURING TESTS OF ASBESTOS CLOTH

N.B. These concentrations are those measured during laboratory tests and do not indicate in any way the concentration which might be found if the materials were tested under different conditions in another testing system, or during the use of manufactured products. The results demonstrate only the relative release of fibres by fabrics when subjected to the stresses as applied in the laboratory test.

Sample Number	Date	Fabric Description	Fabric Code	Concentrations fibres/cc						
				Blank	1st hr (a)	1st hr (b)	1st hr (mean)	4th hr (a)	4th hr (b)	4th hr (mean)
AC8 AC13	15/5/75 20/5/75	Underwriters' brushed, Acrylic treated Untreated	L71-1133 L71-1133	0.11	2.46	2.28	2.37	1.61	1.51	1.56
				0.08	4.78	4.40	4.59	2.28	2.61	2.49
AC6	13/5/75	Plain wet brushed Acrylic treated	9P135N	0.12	1.77	1.57	1.67	1.56	1.35	1.45