## Appendix B-1
## Length and Width Distributions From Published Studies as Matched to Epidemiology Studies

**Size Distribution References**

| *Code* | *Full Reference* |
|---|---|
| D&H | Dement, JM and Harris, RL. 1979. NTIS PB80-149644. U.S. HEW Contract #78-2438. |
| H&G | Hwang, CY and Gibbs, GW. 1981. *Annals of Occupational Hygiene* , **24**(1): 23-41. |
| G&H | Gibbs, GW and Hwang, CY. 1980. In Biological Effects of Mineral Fibres (Edited by WAGNER, J. C), Vol. 1, pp 69-78. |
| Sebastien | Sebastien 1983. Analysis by analytical transmission electron microscopy of fibrous particles in Libby's air samples. Preliminary Results. |

**Industry Descriptions**

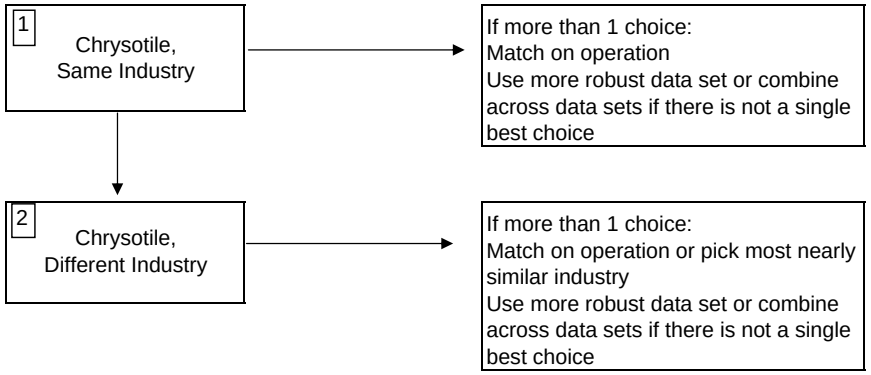
| **Fiber Type** | | **Industry** | |
|---|---|---|---|
| *Code* | *Desc.* | *Code* | *Desc.* |
| C | Chrysotile | T | Textiles |
| AM | Amosite | I | Insulation Mfg. |
| CR | Crocidolite | FP | Friction Products |
| LA | Libby Amphibole | CP | Cement Mfg. |
| TREM | Tremolite | M | Mining |
| ANTH | Anthophyllite | | |

**Descriptions of sheets contained herein:**

Decision Tree: Flow Chart for making decisions on matching TEM data sets to epidemiology studies
Study Selection Tool: Tool for matching TEM data sets to epidemiology studies based on mineral type and industry.
TEM Match: Summary of assigned TEM data sets to epidemiology studies.
D&H CT: Data sets from Dement and Harris (1979) for chrysotile textile production plants.
D&H CFP: Data sets from Dement and Harris (1979) for chrysotile friction product production plants.
D&H CCP: Data sets from Dement and Harris (1979) for chrysotile cement pipe production plants.
D&H AI: Data sets from Dement and Harris (1979) for amosite insulation manufacturing plants.
D&H TREM: Data sets from Dement and Harris (1979) for tremolite talc production at mines and mills.
D&H ANTH: Data sets from Dement and Harris (1979) for anthophyllite talc production at mines and mills.
G&H Raw Data: TEM data sets as reported in Gibbs and Hwang (1980) with calculated adjustment factors.
G&H Adjustments: TEM data reported in Gibbs and Hwang (1980) adjusted.
H&G CR: Data sets from Hwang and Gibbs (1981).
Sebastien_Libby: Data from Sebastien et al. (1983) for Libby, MT.
Lung Cancer Summary: Data sets chosen for application to epidemiology lung cancer data set.
Meso Summary: Data sets chosen for application to epidemiology mesothelioma data set.

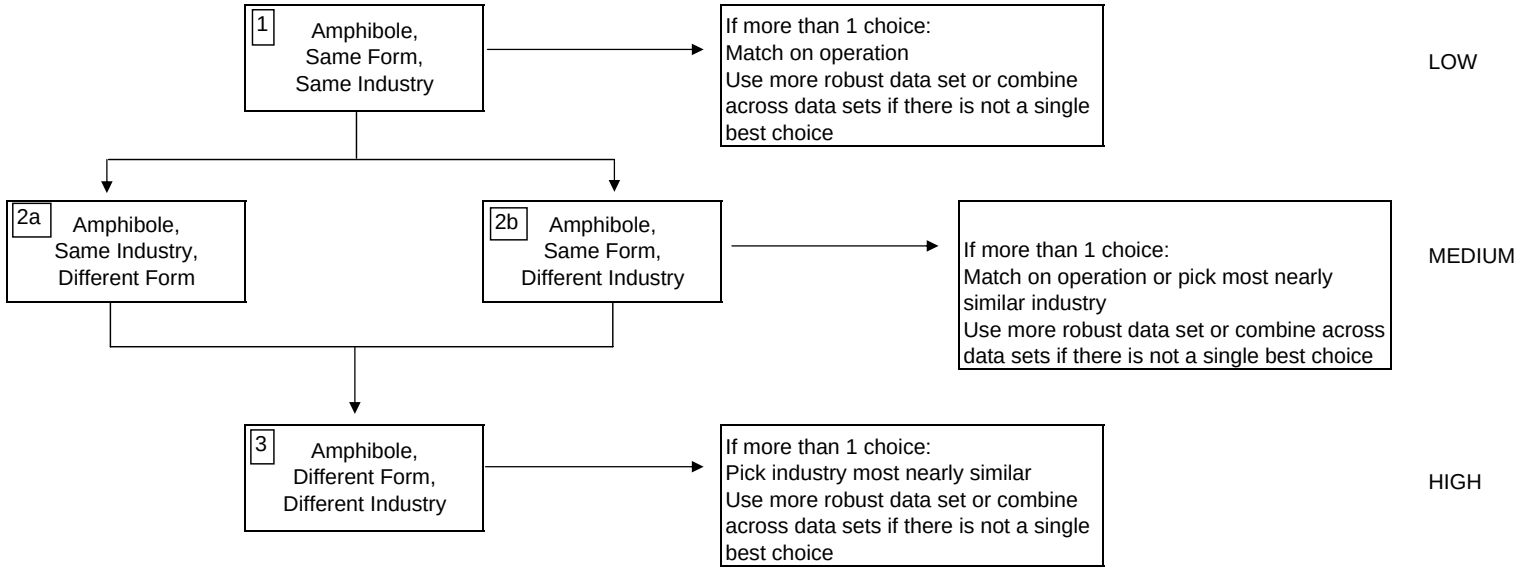
**DECISION TREE FOR SELECTING TEM DATA SETS**

*Panel A: Chrysotile*




*Panel B: Amphibole*

*Form* Specific mineral form of amphibole = amosite, crocidolite, tremolite, anthophyllite, libby amphibole



**SPREADSHEET TOOL FOR SELECTING THE BEST TEM DATA MATCH TO AN EPIDEMIOLOGICAL WORKPLACE**

Using the data filters:

1) In Column F, select the asbestos type (chrysotile or amphibole)
2) If amphibole, in column G, select the amphibole form
3) In column N, select the industry
4) If there is more than one set, select the set that is most releveant, or combine that data from all relevant sets

| | | | | | | Mineral Form | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Index | Reference | Notes | Data Source | | Mineral Type | Primary | Secondary | Industry | Operation | Location |
| 1 | Gibbs and Hwang 1980 | 1 | Table 2 | Column 1 | Amphibole | Amosite | | Mining/milling | Mining | Transvaal, South Africa |
| 2 | Gibbs and Hwang 1980 | 1 | Table 2 | Column 2 | Amphibole | Amosite | | Mining/milling | Bagging | Transvaal, South Africa |
| 3 | Gibbs and Hwang 1980 | 1 | Table 2 | Column 3 | Amphibole | Crocidolite | | Mining/milling | Mining | Cape Province, South Africa |
| 4 | Gibbs and Hwang 1980 | 1 | Table 2 | Column 4 | Amphibole | Crocidolite | | Mining/milling | Bagging | Cape Province, South Africa |
| 5 | Gibbs and Hwang 1980 | 1 | Table 2 | Column 5 | Chrysotile | Chrysotile | | Mining/milling | Mining | Quebec, Canada |
| 6 | Gibbs and Hwang 1980 | 1 | Table 2 | Column 6 | Chrysotile | Chrysotile | | Mining/milling | Bagging | Quebec, Canada |
| 7 | Hwang and Gibbs 1981 | 2 | Table 3a | Left block | Amphibole | Crocidolite | | Mining/milling | Mining and milling (bagging, storage, crushing) | Cape Province, South Africa |
| 8 | Hwang and Gibbs 1981 | 2 | Table 3a | Center block | Amphibole | Crocidolite | | Cement pipe mfg | Preparation (Dumping/mixing) | South Africa (Cape asbestos) |
| 9 | Hwang and Gibbs 1981 | 2 | Table 3a | Right block | Amphibole | Crocidolite | Chrysotile | Cement pipe mfg | Finishing (cutting) | South Africa (Cape asbestos) |
| 10 | Hwang and Gibbs 1981 | 2 | Table 5 | Top block | Amphibole | Crocidolite | | Mining/milling | Mining | Cape Province, South Africa |
| 11 | Hwang and Gibbs 1981 | 2 | Table 5 | Middle block | Amphibole | Crocidolite | | Mining/milling | Bagging | Cape Province, South Africa |
| 12 | Hwang and Gibbs 1981 | 2 | Table 5 | Lower block | Amphibole | Crocidolite | | Cement pipe mfg | Dumping | South Africa (Cape asbestos) |
| 13 | Dement and Harris 1979 | 3 | Table C-1 | | Chrysotile | Chrysotile | | Textiles | Preparation | Unspecified location |
| 14 | Dement and Harris 1979 | 3 | Table C-2 | | Chrysotile | Chrysotile | | Textiles | Twisting | Unspecified location |
| 15 | Dement and Harris 1979 | 3 | Table C-3 | | Chrysotile | Chrysotile | | Textiles | Weaving | Unspecified location |
| 16 | Dement and Harris 1979 | 3 | Table C-4 | | Chrysotile | Chrysotile | | Friction Products | Mixing | Unspecified location |
| 17 | Dement and Harris 1979 | 3 | Table C-5 | | Chrysotile | Chrysotile | | Friction Products | Forming | Unspecified location |
| 18 | Dement and Harris 1979 | 3 | Table C-6 | | Chrysotile | Chrysotile | | Friction Products | Finishing | Unspecified location |
| 19 | Dement and Harris 1979 | 3 | Table C-7 | | Chrysotile | Chrysotile | | Cement pipe mfg | Mixing | Unspecified location |
| 20 | Dement and Harris 1979 | 3 | Table C-8 | | Chrysotile | Chrysotile | | Cement pipe mfg | Forming | Unspecified location |
| 21 | Dement and Harris 1979 | 3 | Table C-9 | | Chrysotile | Chrysotile | | Cement pipe mfg | Finishing | Unspecified location |
| 22 | Dement and Harris 1979 | 3 | Table C-10 | | Amphibole | Amosite | | Pipe insulation mfg | Mixing | Unspecified location |
| 23 | Dement and Harris 1979 | 3 | Table C-11 | | Amphibole | Amosite | | Pipe insulation mfg | Forming | Unspecified location |
| 24 | Dement and Harris 1979 | 3 | Table C-12 | | Amphibole | Amosite | | Pipe insulation mfg | Finishing | Unspecified location |
| 25 | Dement and Harris 1979 | 3 | Table C-13 | | Amphibole | Anthophyllite | | Talc Production | Mining/milling | Unspecified location |
| 26 | Dement and Harris 1979 | 3 | Table C-14 | | Amphibole | Anthophyllite | | Talc Production | Mining/milling | Unspecified location |
| 27 | Dement and Harris 1979 | 3 | Table C-15 | | Amphibole | Tremolite | | Talc Production | Mining/milling | Unspecified location |
| 28 | Sebastien 1983 | | Table II | | Amphibole | Libby Amphibole | | Mining/milling | Mining/milling | Libby, MT |

NOTES

1 AR ≥ 3:1
Length truncated at 20 um
No particles with D > 3
Min L ≈ 0.5
Min D ≈ 0.01

2 AR ≥ 3:1
Small overestimate of fibers > 24 um
Bundles and aggregates counted as 1

3 AR ≥ 3:1
Samples collected by NIOSH during numerous field investigations between approximately 1971 and 1977.
All samples were personal breathing zone samples.
Midpoints of size intervals reported.
Midpoint of the largest interval was approximated by extrapolation based on a log-normal size distribution.

## TEM DATA SETS MATCHED TO EPIDEMIOLOGY STUDIES

| Epidemiological Study | | | | | Primary Asbestos Type | | | | Secondary Asbestos Type | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference | Industry | Activities of exposed cohort | Location | Source of Asbestos | Fiber Type | TEM Match | | Uncertainty | Fiber Type | TEM Match | | Uncertainty | |
| Berry & Newhouse 1983 | Friction Products | Coating, forming, machining | Britain, UK | NR | Chrysotile | D&H 1979 | 16,17,18 | Low | Crocidolite | H&G 1981 | 3,4,7,8,9, 10,11,12 | Medium | [1] |
| Hein et al. 2007<br>McDonald et al. 1983 | Textile Mfg. | Preparation, carding, spinning, spooling, twisting, winding, braiding, weaving, and finishing. | South Carolina, USA | Quebec and Rhodesia | Chrysotile | D&H 1979 | 13,14,15 | Low | Tremolite (amphibole contamination) | H&G 1981 | 27 | Medium | [1] |
| Henderson and Enterline 1979 | Mixed Industry | Amosite only (processes unknown) | United States | NR | Amosite | D&H 1979 | 22,23,24, 1,2 | Low | | | | | |
| Henderson and Enterline 1979 | Mixed Industry | Chrysotile only (processes unknown) | United States | NR | Chrysotile | D&H 1979<br>G&H 1980 | 5,6,13,14, 15,16,17,18, 19,20,21 | Low | Tremolite (amphibole contamination) | D&H 1979 | 27 | Low | |
| Henderson and Enterline 1979 | Mixed Industry | Cement pipe mfg. (mixed asbestos types) | United States | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite | H&G 1981 | 8,9,12 | Low | [2] |
| Finkelstein 1984 | Asbestos Cement Mfg. | Mixing, forming, lathe | Ontario, Canada | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite | H&G 1981 | 8,9,12 | Low | |
| Hughes et al. 1987 | Asbestos Cement Mfg. | Flat shingle and corrugated sheet production | New Orleans, USA | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite & Amosite | H&G 1981 | 8,9,12, 1, 2, 22, 23, 24 | Medium | [2] |
| Hughes et al. 1987 | Asbestos Cement Mfg. | Asphalt roofing and flooring materials | New Orleans, USA | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Tremolite (amphibole contamination) | D&H 1979 | 27 | Medium | [1] |
| Hughes et al. 1987 | Asbestos Cement Mfg. | Pipe production | New Orleans, USA | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite | H&G 1981 | 8,9,12 | Low | |
| McDonald et al. 1993 | Mining and Milling | Mining and milling | Asbestos, Quebec | Asbestos, Quebec | Chrysotile | G&H 1980 | 5,6 | Low | Tremolite | D&H 1979 | 27 | Low | |
| McDonald et al. 1993 | Mining and Milling | Mining | Thetford, Quebec | Thetford, Quebec | Chrysotile | G&H 1980 | 5,6 | Low | Tremolite | D&H 1979 | 27 | Low | |
| McDonald et al. 1993 | Mining and Milling | Mining and milling | Asbestos, Quebec | Quebec | Chrysotile | G&H 1980 | 5,6 | Low | Tremolite | D&H 1979 | 27 | Low | |
| McDonald et al. 1982 | Textile Mfg.<br>Friction Products Mfg. | Textile Operations: cleaning, opening, carding, spinning, winding, weaving, finishing; FP Operations: blending, extruding, rolling, and bricketting | Pennsylvania, USA | Canada and Rhodesia | Chrysotile | D&H 1979 | 13,14,15/ 16,17,18 | Low | Crocidolite & Amosite | H&G 1981<br>D&H 1979 | 10,11,12,3, 4,7,8,9,22, 23,24 | Medium | [1] |
| McDonald et al. 1984 | Friction Products Mfg. | Opening, preparation, mixing, grinding, finishing | Connecticut, USA | Canada | Chrysotile | D&H 1979 | 16,17,18 | Low | Anthophyllite | D&H 1979 | 25, 26 | Medium | [1] |
| Peto et al. 1985 | Textile Mfg. | Carding, spinning, weaving | Rochdale, England | Rhodesia, Canada, Zimbabwe | Chrysotile | D&H 1979 | 13,14,15 | Low | Crocidolite | H&G 1981 | 3,4,7,8,9, 10,11,12 | Medium | [1] |
| Piolatto et al. 1990 | Mining and Milling | Mining, milling, crushing, screening, and bagging | Balangero, Italy | Balangero, Italy | Chrysotile | G&H 1980 | 5,6 | Low | Tremolite (amphibole contamination) | D&H 1979 | 27 | Low | |
| Seidman et al. 1986 | Insulation Mfg. | Mill, textile work, pipe covering, and block making | Patterson, New Jersey, USA | Transvaal Region, South Africa | Amosite | D&H 1979 | 22,23,24 | Low | Chrysotile | D&H 1979<br>G&H 1980 | 5,6,13,14, 15,16,17,1 8, 19,20,21 | Medium | [1] |
| Albin et al. 1990 | Asbestos Cement Mfg. | Milling, mixing, machining, sawing, grinding | Southern Sweden | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite & Amosite | H&G 1981 | 8,9,12, 1, 2, 22, 23, 24 | Medium | [2] |
| McDonald et al. 2004 | Vermiculite Mining and Milling | Pooled (Mining and milling) | Libby, Montana, USA | Libby, MT | Libby Amphibole | Sebastien 1993 | 28 | Low | | | | | |
| de Klerk et al. 1989 | Mining and Milling | Mining and milling | Wittenoom, Australia | Wittenoom, Australia | Crocidolite | G&H 1980<br>H&G 1981 | 3,4<br>7,10,11 | Low | | | | | |
| Lacquet et al. 1980 | Asbestos Cement Mfg. | Milling, preparing, molding, sawing, drilling, and filing | Belgium | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite & Amosite | H&G 1981 | 8,9,12, 1, 2, 22, 23, 24 | Medium | [2] |
| Neuberger and Kundi 1990 | Asbestos Cement Mfg. | Preparing, mixing, finishing | Vocklabruck, Austria | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite | H&G 1981 | 8,9,12 | Low | |
| Yano et al. 2001 | Textile Mfg.; Friction Products Mfg.; Asbestos Cement Mfg. | Pooled within job categories | Chongqin, China | Sichuan, China | Chrysotile | D&H 1979 | 13-21 | Low | | | | | |
| Tulchinsky et al. 1999 | Asbestos Cement Mfg. | Pipe production, flat and corrugated sheets | Israel | NR | Chrysotile | D&H 1979 | 19,20,21 | Low | Crocidolite | H&G 1981 | 8,9,12 | Low | |

NR = Not Reported

[1] Matched TEM study is based on Option 2b from the decision tree matching fiber type and amphibole form, but not industry.

[2] Multiple amphibole forms were used at this facility. Matched TEM study is based on Option 2a from the decision tree matching fiber type and industry, but not all amphibole forms.

**RAW DATA TABLES AS PRESENTED IN DEMENT AND HARRIS 1979**

| | | | | | | | | | | | | | | | | | Total | 6917 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-1** | | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | | |
| **Industry:** | **Textile Products** | | | | | | | | | | | | | | | | | |
| **Operation:** | **Fiber Preparation** | | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | | |
| **0.08** | 0 | 0 | 53 | 89 | 351 | 586 | 490 | 330 | 218 | 198 | 113 | 119 | 50 | 80 | 114 | 67 | | |
| **0.15** | 0 | 0 | 1 | 3 | 63 | 376 | 291 | 164 | 130 | 96 | 66 | 52 | 37 | 58 | 92 | 75 | | |
| **0.25** | 0 | 0 | 0 | 0 | 6 | 123 | 153 | 161 | 92 | 98 | 67 | 45 | 41 | 36 | 104 | 95 | | |
| **0.35** | 0 | 0 | 0 | 0 | 1 | 3 | 40 | 56 | 58 | 43 | 24 | 33 | 7 | 21 | 60 | 64 | | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 5 | 25 | 37 | 19 | 21 | 12 | 11 | 64 | 111 | | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 12 | 23 | 6 | 6 | 7 | 6 | 30 | 29 | | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 1 | 7 | 6 | 2 | 5 | 15 | 24 | | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 2 | 4 | 2 | 3 | 5 | 10 | 17 | | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 3 | 2 | 1 | 12 | | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 6 | 11 | 5 | 16 | 11 | 11 | | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 5 | 19 | 7 | 8 | 202 | 223 | | |

| | | | | | | | | | | | | | | | | | Total | 5817 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-2** | | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | | |
| **Industry:** | **Textile Products** | | | | | | | | | | | | | | | | | |
| **Operation:** | **Twisting Operations** | | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | | |
| **0.08** | 0 | 0 | 67 | 146 | 574 | 877 | 524 | 336 | 170 | 171 | 88 | 71 | 41 | 62 | 87 | 88 | | |
| **0.15** | 0 | 0 | 0 | 4 | 46 | 224 | 188 | 123 | 87 | 75 | 47 | 72 | 24 | 27 | 67 | 89 | | |
| **0.25** | 0 | 0 | 0 | 0 | 8 | 51 | 81 | 64 | 95 | 47 | 27 | 40 | 17 | 22 | 58 | 75 | | |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 5 | 20 | 18 | 17 | 21 | 14 | 23 | 6 | 10 | 36 | 69 | | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 20 | 21 | 19 | 11 | 18 | 6 | 18 | 35 | 69 | | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 4 | 3 | 6 | 2 | 4 | 13 | 21 | | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 | 6 | 5 | 2 | 4 | 4 | 8 | 23 | | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 0 | 2 | 5 | 6 | | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 4 | 10 | 2 | 7 | 20 | 12 | | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 2 | 2 | 4 | 49 | 125 | | |

| | | | | | | | | | | | | | | | | | Total | 4856 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-3** | | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | | |
| **Industry:** | **Textile Products** | | | | | | | | | | | | | | | | | |
| **Operation:** | **Weaving Operations** | | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | | |
| **0.08** | 0 | 0 | 34 | 101 | 479 | 696 | 362 | 294 | 167 | 193 | 120 | 113 | 47 | 62 | 79 | 71 | | |
| **0.15** | 0 | 0 | 0 | 2 | 38 | 193 | 92 | 76 | 50 | 99 | 45 | 35 | 15 | 46 | 88 | 76 | | |
| **0.25** | 0 | 0 | 0 | 0 | 1 | 33 | 40 | 45 | 18 | 24 | 27 | 30 | 6 | 47 | 69 | 56 | | |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 11 | 6 | 11 | 10 | 11 | 5 | 11 | 19 | 28 | | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 8 | 11 | 11 | 11 | 31 | 10 | 46 | 55 | 89 | | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 7 | 5 | 4 | 1 | 1 | 1 | 8 | 16 | | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 3 | 2 | 3 | 7 | 14 | | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 1 | 2 | 5 | 6 | | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 0 | 27 | 7 | 2 | | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 8 | 5 | 9 | 51 | 155 | | |

**DATA NORMALIZED TO 100**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | |
| **Industry:** | **Textile Products** | | | | | | | | | | | | | | | |
| **Operation:** | **Fiber Preparation** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0.0076623 | 0.0128668 | 0.0507445 | 0.0847188 | 0.07084 | 0.047709 | 0.031517 | 0.028625 | 0.016337 | 0.017204 | 0.007229 | 0.011566 | 0.016481 | 0.009686 |
| **0.1-0.2** | 0 | 0 | 0.0001446 | 0.0004337 | 0.009108 | 0.0543588 | 0.04207 | 0.02371 | 0.018794 | 0.013879 | 0.009542 | 0.007518 | 0.005349 | 0.008385 | 0.013301 | 0.010843 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0.0008674 | 0.0177823 | 0.022119 | 0.023276 | 0.013301 | 0.014168 | 0.009686 | 0.006506 | 0.005927 | 0.005205 | 0.015035 | 0.013734 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0.0001446 | 0.0004337 | 0.005783 | 0.008096 | 0.008385 | 0.006217 | 0.00347 | 0.004771 | 0.001012 | 0.003036 | 0.008674 | 0.009253 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0.0001446 | 0.001446 | 0.000723 | 0.003614 | 0.005349 | 0.002747 | 0.003036 | 0.001735 | 0.00159 | 0.009253 | 0.016047 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.000578 | 0.000723 | 0.001735 | 0.003325 | 0.000867 | 0.000867 | 0.001012 | 0.000867 | 0.004337 | 0.004193 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000145 | 0.001012 | 0.000145 | 0.001012 | 0.000867 | 0.000289 | 0.000723 | 0.002169 | 0.00347 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000289 | 0.000867 | 0.000289 | 0.000578 | 0.000289 | 0.000434 | 0.000723 | 0.001446 | 0.002458 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000145 | 0 | 0 | 0.000578 | 0.000434 | 0.000289 | 0.000145 | 0.001735 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000145 | 0.000578 | 0.000723 | 0.000867 | 0.00159 | 0.000723 | 0.002313 | 0.00159 | 0.00159 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000145 | 0 | 0.000434 | 0.000723 | 0.002747 | 0.001012 | 0.001157 | 0.029203 | 0.032239 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | |
| **Industry:** | **Textile Products** | | | | | | | | | | | | | | | |
| **Operation:** | **Twisting Operations** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0.011518 | 0.0250988 | 0.0986763 | 0.150765 | 0.090081 | 0.057762 | 0.029225 | 0.029397 | 0.015128 | 0.012206 | 0.007048 | 0.010658 | 0.014956 | 0.015128 |
| **0.1-0.2** | 0 | 0 | 0 | 0.0006876 | 0.0079079 | 0.0385078 | 0.032319 | 0.021145 | 0.014956 | 0.012893 | 0.00808 | 0.012378 | 0.004126 | 0.004642 | 0.011518 | 0.0153 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0.0013753 | 0.0087674 | 0.013925 | 0.011002 | 0.016331 | 0.00808 | 0.004642 | 0.006876 | 0.002922 | 0.003782 | 0.009971 | 0.012893 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0.0008595 | 0.003438 | 0.003094 | 0.002922 | 0.00361 | 0.002407 | 0.003954 | 0.001031 | 0.001719 | 0.006189 | 0.011862 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0.0003438 | 0.001031 | 0.003438 | 0.00361 | 0.003266 | 0.001891 | 0.003094 | 0.001031 | 0.003094 | 0.006017 | 0.011862 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.000172 | 0.000172 | 0.000688 | 0.000688 | 0.000516 | 0.001031 | 0.000344 | 0.000688 | 0.002235 | 0.00361 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0.000344 | 0 | 0.000688 | 0.001031 | 0.00086 | 0.000344 | 0.000688 | 0.000688 | 0.001375 | 0.003954 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0.000172 | 0.000172 | 0.000172 | 0 | 0.000172 | 0.000344 | 0 | 0.000344 | 0.00086 | 0.001031 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00086 | 0.000688 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000344 | 0 | 0.000516 | 0.000688 | 0.001719 | 0.000344 | 0.001203 | 0.003438 | 0.002063 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000344 | 0.000172 | 0.000516 | 0.000344 | 0.000344 | 0.000688 | 0.008424 | 0.021489 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | |
| **Industry:** | **Textile Products** | | | | | | | | | | | | | | | |
| **Operation:** | **Weaving Operations** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0.0070016 | 0.020799 | 0.0986409 | 0.1433278 | 0.074547 | 0.060544 | 0.03439 | 0.039745 | 0.024712 | 0.02327 | 0.009679 | 0.012768 | 0.016269 | 0.014621 |
| **0.1-0.2** | 0 | 0 | 0 | 0.0004119 | 0.0078254 | 0.0397446 | 0.018946 | 0.015651 | 0.010297 | 0.020387 | 0.009267 | 0.007208 | 0.003089 | 0.009473 | 0.018122 | 0.015651 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0.0002059 | 0.0067957 | 0.008237 | 0.009267 | 0.003707 | 0.004942 | 0.00556 | 0.006178 | 0.001236 | 0.009679 | 0.014209 | 0.011532 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0.0002059 | 0.001853 | 0.002265 | 0.001236 | 0.002265 | 0.002059 | 0.002265 | 0.00103 | 0.002265 | 0.003913 | 0.005766 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0.0002059 | 0.000824 | 0.001647 | 0.002265 | 0.002265 | 0.002265 | 0.006384 | 0.002059 | 0.009473 | 0.011326 | 0.018328 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.000412 | 0.000412 | 0.001442 | 0.00103 | 0.000824 | 0.000206 | 0.000206 | 0.000206 | 0.001647 | 0.003295 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000412 | 0.000412 | 0.000412 | 0.000618 | 0.000412 | 0.000618 | 0.001442 | 0.002883 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000206 | 0 | 0 | 0.000824 | 0.000206 | 0.000412 | 0.00103 | 0.001236 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.002265 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000206 | 0.000412 | 0.001236 | 0 | 0.00556 | 0.001442 | 0.000412 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000206 | 0.000412 | 0.001647 | 0.00103 | 0.001853 | 0.010502 | 0.031919 |

## BINS OF INTEREST BY OPERATION

**Reference:** **Dement and Harris 1979** *Index 13*
**Fiber Type:** **Chrysotile**
**Industry:** **Textiles**
**Operation:** **Fiber Preparation**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.6397 | 0.037299 | 0.027396 | 0.1422 |
| 0.25<w<0.4 | 0.1008 | 0.0162 | 0.0161 | |
| w < 0.4 | 0.7405 | 0.0535 | 0.0435 | |
| w > 0.4 | 0.0526 | 0.0481 | 0.0617 | |

**Reference:** **Dement and Harris 1979** *Index 14*
**Fiber Type:** **Chrysotile**
**Industry:** **Textiles**
**Operation:** **Twisting Operations**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.7341 | 0.03146 | 0.036875 | 0.0974 |
| 0.25<w<0.4 | 0.0619 | 0.0112 | 0.0183 | |
| w < 0.4 | 0.7959 | 0.0426 | 0.0552 | |
| w > 0.4 | 0.0383 | 0.0232 | 0.0447 | |

**Reference:** **Dement and Harris 1979** *Index 15*
**Fiber Type:** **Chrysotile**
**Industry:** **Textiles**
**Operation:** **Weaving Operations**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.7196 | 0.041495 | 0.036038 | 0.1103 |
| 0.25<w<0.4 | 0.0433 | 0.0110 | 0.0115 | |
| w < 0.4 | 0.7630 | 0.0525 | 0.0476 | |
| w > 0.4 | 0.0492 | 0.0274 | 0.0603 | |

## BINS OF INTEREST ACROSS OPERATIONS

**Reference:** **Dement and Harris 1979** *Index 13, 14 ,15*
**Fiber Type:** **Chrysotile**
**Industry:** **Textile Products**
**Operation:** **All Operations**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.6978 | 0.0368 | 0.0334 | 0.1166 |
| 0.25<w<0.4 | 0.0687 | 0.0128 | 0.0153 | |
| w < 0.4 | 0.7665 | 0.0495 | 0.0488 | |
| w > 0.4 | 0.0467 | 0.0329 | 0.0556 | |

NOTE: For the purposes of assigning bins with a width cutoff of 0.25 um, a factor of 0.50 was assumed.

**RAW DATA TABLES AS PRESENTED IN DEMENT AND HARRIS 1979**

| | | | | | | | | | | | | | | | | Total | 6143 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-4** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | |
| **Industry:** | **Friction Products** | | | | | | | | | | | | | | | | |
| **Operation:** | **Mixing** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | |
| **0.08** | 0 | 19 | 196 | 402 | 855 | 956 | 571 | 325 | 183 | 158 | 81 | 88 | 39 | 61 | 99 | 63 | |
| **0.15** | 0 | 0 | 0 | 0 | 81 | 233 | 178 | 158 | 78 | 75 | 52 | 36 | 13 | 41 | 39 | 95 | |
| **0.25** | 0 | 0 | 0 | 0 | 6 | 87 | 80 | 60 | 52 | 35 | 25 | 28 | 11 | 16 | 40 | 49 | |
| **0.35** | 0 | 0 | 0 | 0 | 1 | 9 | 11 | 21 | 23 | 18 | 14 | 15 | 5 | 11 | 23 | 37 | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 2 | 11 | 12 | 13 | 10 | 18 | 17 | 8 | 10 | 14 | 34 | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 5 | 3 | 2 | 1 | 0 | 6 | 7 | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 4 | 1 | 3 | 3 | 11 | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 5 | 2 | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 2 | 3 | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 18 | 37 | |

| | | | | | | | | | | | | | | | | Total | 3767 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-5** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | |
| **Industry:** | **Friction Products** | | | | | | | | | | | | | | | | |
| **Operation:** | **Product Forming** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | |
| **0.08** | 0 | 0 | 85 | 182 | 564 | 683 | 395 | 138 | 98 | 82 | 47 | 59 | 16 | 54 | 44 | 32 | |
| **0.15** | 0 | 0 | 0 | 8 | 57 | 174 | 113 | 63 | 46 | 48 | 34 | 40 | 12 | 29 | 48 | 34 | |
| **0.25** | 0 | 0 | 0 | 0 | 2 | 19 | 49 | 32 | 28 | 26 | 21 | 29 | 8 | 26 | 27 | 38 | |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 9 | 5 | 10 | 11 | 8 | 1 | 12 | 13 | 16 | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | 9 | 2 | 15 | 2 | 11 | 19 | 15 | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 1 | 2 | 4 | 1 | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 1 | 5 | 6 | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 6 | 4 | 1 | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 9 | 31 | |

| | | | | | | | | | | | | | | | | Total | 2700 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-6** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | |
| **Industry:** | **Friction Products** | | | | | | | | | | | | | | | | |
| **Operation:** | **Product Finishing** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | |
| **0.08** | 0 | 2 | 34 | 86 | 299 | 371 | 224 | 113 | 71 | 128 | 47 | 31 | 12 | 39 | 36 | 21 | |
| **0.15** | 0 | 0 | 0 | 2 | 46 | 110 | 75 | 38 | 36 | 57 | 13 | 17 | 4 | 14 | 49 | 14 | |
| **0.25** | 0 | 0 | 0 | 0 | 1 | 22 | 27 | 24 | 24 | 38 | 11 | 13 | 4 | 10 | 29 | 20 | |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 12 | 12 | 18 | 8 | 7 | 4 | 3 | 19 | 6 | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 17 | 9 | 18 | 9 | 20 | 6 | 11 | 35 | 29 | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 3 | 2 | 3 | 1 | 2 | 6 | 7 | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 3 | 0 | 3 | 2 | 0 | 6 | 6 | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 1 | 3 | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 1 | 0 | 1 | 7 | 0 | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 0 | 17 | 124 | |

**DATA NORMALIZED TO 100**

**Reference:** Dement and Harris 1979
**Fiber Type:** Chrysotile
**Industry:** Friction Products
**Operation:** Mixing

| | Length (um) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0.003093 | 0.031906 | 0.06544 | 0.1391828 | 0.1556243 | 0.0929513 | 0.0529057 | 0.02979 | 0.02572 | 0.013186 | 0.014325 | 0.006349 | 0.00993 | 0.016116 | 0.010256 |
| **0.1-0.2** | 0 | 0 | 0 | 0 | 0.0131857 | 0.0379294 | 0.0289761 | 0.0257203 | 0.012697 | 0.012209 | 0.008465 | 0.00586 | 0.002116 | 0.006674 | 0.006349 | 0.015465 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0.0009767 | 0.0141625 | 0.013023 | 0.0097672 | 0.008465 | 0.005698 | 0.00407 | 0.004558 | 0.001791 | 0.002605 | 0.006511 | 0.007977 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0.0001628 | 0.0014651 | 0.0017907 | 0.0034185 | 0.003744 | 0.00293 | 0.002279 | 0.002442 | 0.000814 | 0.001791 | 0.003744 | 0.006023 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0.0003256 | 0.0017907 | 0.0019534 | 0.002116 | 0.001628 | 0.00293 | 0.002767 | 0.001302 | 0.001628 | 0.002279 | 0.005535 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0001628 | 0.0001628 | 0.000326 | 0.000814 | 0.000488 | 0.000326 | 0.000163 | 0 | 0.000977 | 0.00114 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0001628 | 0.000163 | 0.000326 | 0.000163 | 0.000651 | 0.000163 | 0.000488 | 0.000488 | 0.001791 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000163 | 0.000163 | 0 | 0 | 0.000326 | 0 | 0.000814 | 0.000326 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000163 | 0 | 0.000488 | 0.000163 | 0 | 0.000326 | 0.000488 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000977 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000488 | 0 | 0 | 0.000326 | 0.00293 | 0.006023 |

**Reference:** Dement and Harris 1979
**Fiber Type:** Chrysotile
**Industry:** Friction Products
**Operation:** Product Forming

| | Length (um) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0.022564 | 0.048314 | 0.1497213 | 0.1813114 | 0.104858 | 0.0366339 | 0.026015 | 0.021768 | 0.012477 | 0.015662 | 0.004247 | 0.014335 | 0.01168 | 0.008495 |
| **0.1-0.2** | 0 | 0 | 0 | 0.002124 | 0.0151314 | 0.0461906 | 0.0299973 | 0.0167242 | 0.012211 | 0.012742 | 0.009026 | 0.010619 | 0.003186 | 0.007698 | 0.012742 | 0.009026 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0.0005309 | 0.0050438 | 0.0130077 | 0.0084948 | 0.007433 | 0.006902 | 0.005575 | 0.007698 | 0.002124 | 0.006902 | 0.007168 | 0.010088 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0015928 | 0.0023892 | 0.001327 | 0.002655 | 0.00292 | 0.002124 | 0.000265 | 0.003186 | 0.003451 | 0.004247 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0013273 | 0.001062 | 0.002389 | 0.000531 | 0.003982 | 0.000531 | 0.00292 | 0.005044 | 0.003982 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0.0002655 | 0 | 0.0002655 | 0.000265 | 0.000531 | 0 | 0 | 0.000265 | 0.000531 | 0.001062 | 0.000265 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0002655 | 0 | 0.000265 | 0 | 0 | 0 | 0 | 0 | 0.001327 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000265 | 0.000265 | 0.001062 | 0 | 0.000265 | 0.001327 | 0.001593 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000265 | 0.000265 | 0 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000531 | 0 | 0.000796 | 0 | 0.001593 | 0.001062 | 0.000265 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.002124 | 0.002389 | 0.008229 |

**Reference:** Dement and Harris 1979
**Fiber Type:** Chrysotile
**Industry:** Friction Products
**Operation:** Product Finishing

| | Length (um) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0.000741 | 0.012593 | 0.031852 | 0.1107407 | 0.1374074 | 0.082963 | 0.0418519 | 0.026296 | 0.047407 | 0.017407 | 0.011481 | 0.004444 | 0.014444 | 0.013333 | 0.007778 |
| **0.1-0.2** | 0 | 0 | 0 | 0.000741 | 0.017037 | 0.0407407 | 0.0277778 | 0.0140741 | 0.013333 | 0.021111 | 0.004815 | 0.006296 | 0.001481 | 0.005185 | 0.018148 | 0.005185 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0.0003704 | 0.0081481 | 0.01 | 0.0088889 | 0.008889 | 0.014074 | 0.004074 | 0.004815 | 0.001481 | 0.003704 | 0.010741 | 0.007407 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0.0022222 | 0.0011111 | 0.0044444 | 0.004444 | 0.006667 | 0.002963 | 0.002593 | 0.001481 | 0.001111 | 0.007037 | 0.002222 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0014815 | 0.0062963 | 0.003333 | 0.006667 | 0.003333 | 0.007407 | 0.002222 | 0.004074 | 0.012963 | 0.010741 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0014815 | 0.00037 | 0.001111 | 0.000741 | 0.001111 | 0.00037 | 0.000741 | 0.002222 | 0.002593 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0003704 | 0.0007407 | 0.001111 | 0.001111 | 0 | 0.001111 | 0.000741 | 0 | 0.002222 | 0.002222 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0.0003704 | 0 | 0 | 0 | 0.00037 | 0.001481 | 0.00037 | 0 | 0 | 0.00037 | 0.001111 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000741 | 0 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00037 | 0.000741 | 0.001481 | 0.00037 | 0 | 0.00037 | 0.002593 | 0 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000741 | 0.001111 | 0.000741 | 0 | 0.006296 | 0.045926 |

## BINS OF INTEREST BY OPERATION

| | | |
|---|---|---|
| **Reference:** | **Dement and Harris 1979** | *Index 16* |
| **Fiber Type:** | **Chrysotile** | |
| **Industry:** | **Friction Products** | |
| **Operation:** | **Mixing** | |

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.8268 | 0.0257 | 0.0297 | 0.0411 |
| 0.25<w<0.4 | 0.0534 | 0.0070 | 0.0100 | |
| w < 0.4 | 0.8802 | 0.0327 | 0.0397 | |
| w > 0.4 | 0.0233 | 0.0078 | 0.0163 | |

| | | |
|---|---|---|
| **Reference:** | **Dement and Harris 1979** | *Index 17* |
| **Fiber Type:** | **Chrysotile** | |
| **Industry:** | **Friction Products** | |
| **Operation:** | **Product Forming** | |

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.8354 | 0.0280 | 0.0226 | 0.0431 |
| 0.25<w<0.4 | 0.0483 | 0.0070 | 0.0093 | |
| w < 0.4 | 0.8837 | 0.0350 | 0.0319 | |
| w > 0.4 | 0.0226 | 0.0111 | 0.0157 | |

| | | |
|---|---|---|
| **Reference:** | **Dement and Harris 1979** | *Index 18* |
| **Fiber Type:** | **Chrysotile** | |
| **Industry:** | **Friction Products** | |
| **Operation:** | **Product Finishing** | |

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.7244 | 0.0369 | 0.0167 | 0.1083 |
| 0.25<w<0.4 | 0.0593 | 0.0124 | 0.0059 | |
| w < 0.4 | 0.7837 | 0.0493 | 0.0226 | |
| w > 0.4 | 0.0544 | 0.0274 | 0.0626 | |

## BINS OF INTEREST ACROSS OPERATIONS

| | | |
|---|---|---|
| **Reference:** | **Dement and Harris 1979** | *Index* |
| **Fiber Type:** | **Chrysotile** | *16, 17, 18* |
| **Industry:** | **Friction Products** | |
| **Operation:** | **All Operations** | |

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.7956 | 0.0302 | 0.0230 | 0.0642 |
| 0.25<w<0.4 | 0.0537 | 0.0088 | 0.0084 | |
| w < 0.4 | 0.8492 | 0.0390 | 0.0314 | |
| w > 0.4 | 0.0334 | 0.0155 | 0.0315 | |

NOTE: For the purposes of assigning bins with a width cutoff of 0.25 um, a factor of 0.50 was assumed.

**RAW DATA TABLES AS PRESENTED IN DEMENT AND HARRIS 1979**

| | | | | | | | | | | | | | | | | Total | 2345 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-7** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | |
| **Industry:** | **Cement Pipe** | | | | | | | | | | | | | | | | |
| **Operation:** | **Mixing** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** |
| **0.08** | 0 | 0 | 24 | 72 | 265 | 353 | 173 | 110 | 65 | 48 | 22 | 25 | 13 | 21 | 15 | 13 |
| **0.15** | 0 | 0 | 0 | 0 | 27 | 126 | 75 | 61 | 39 | 33 | 15 | 27 | 10 | 21 | 35 | 34 |
| **0.25** | 0 | 0 | 0 | 0 | 0 | 60 | 40 | 44 | 32 | 19 | 19 | 14 | 8 | 18 | 28 | 16 |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 17 | 13 | 10 | 15 | 13 | 4 | 7 | 20 | 15 |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 13 | 8 | 7 | 2 | 2 | 1 | 9 | 15 | 24 |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 2 | 0 | 1 | 2 | 2 | 4 |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 2 | 0 | 0 | 5 | 5 |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 1 |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 1 |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 3 | 2 | 1 |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 27 | 27 |

| | | | | | | | | | | | | | | | | Total | 2555 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-8** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | |
| **Industry:** | **Cement Pipe** | | | | | | | | | | | | | | | | |
| **Operation:** | **Product Forming** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** |
| **0.08** | 0 | 0 | 17 | 42 | 224 | 333 | 399 | 139 | 72 | 77 | 51 | 44 | 18 | 48 | 52 | 28 |
| **0.15** | 0 | 0 | 0 | 0 | 23 | 132 | 96 | 66 | 41 | 47 | 27 | 32 | 7 | 31 | 27 | 24 |
| **0.25** | 0 | 0 | 0 | 0 | 0 | 34 | 46 | 39 | 27 | 22 | 16 | 12 | 5 | 15 | 19 | 11 |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 9 | 7 | 7 | 7 | 6 | 3 | 9 | 13 | 4 |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 9 | 11 | 6 | 5 | 4 | 12 | 11 | 19 |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 0 | 1 | 2 | 2 |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 2 |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 2 | 0 |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 13 |

| | | | | | | | | | | | | | | | | Total | 4846 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-9** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | | |
| **Industry:** | **Cement Pipe** | | | | | | | | | | | | | | | | |
| **Operation:** | **Product Finishing** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** |
| **0.08** | 0 | 8 | 241 | 332 | 852 | 877 | 502 | 227 | 129 | 74 | 44 | 39 | 26 | 40 | 53 | 17 |
| **0.15** | 0 | 0 | 0 | 7 | 54 | 284 | 152 | 89 | 69 | 45 | 30 | 25 | 26 | 19 | 24 | 15 |
| **0.25** | 0 | 0 | 0 | 0 | 0 | 68 | 55 | 36 | 29 | 50 | 32 | 14 | 4 | 11 | 20 | 14 |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 5 | 10 | 15 | 16 | 3 | 5 | 6 | 5 | 4 | 22 | 5 |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 2 | 6 | 5 | 1 | 12 | 9 | 36 |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 1 |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 3 |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 2 | 2 |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 13 |

**DATA NORMALIZED TO 100**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | |
| **Industry:** | **Cement Pipe** | | | | | | | | | | | | | | | |
| **Operation:** | **Mixing** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0.010235 | 0.030704 | 0.113006 | 0.150533 | 0.073774 | 0.0469083 | 0.027719 | 0.020469 | 0.009382 | 0.010661 | 0.005544 | 0.008955 | 0.006397 | 0.005544 |
| **0.1-0.2** | 0 | 0 | 0 | 0 | 0.011514 | 0.053731 | 0.0319829 | 0.0260128 | 0.016631 | 0.014072 | 0.006397 | 0.011514 | 0.004264 | 0.008955 | 0.014925 | 0.014499 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0 | 0.025586 | 0.0170576 | 0.0187633 | 0.013646 | 0.008102 | 0.008102 | 0.00597 | 0.003412 | 0.007676 | 0.01194 | 0.006823 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0072495 | 0.0072495 | 0.005544 | 0.004264 | 0.006397 | 0.005544 | 0.001706 | 0.002985 | 0.008529 | 0.006397 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0008529 | 0.0055437 | 0.003412 | 0.002985 | 0.000853 | 0.000853 | 0.000426 | 0.003838 | 0.006397 | 0.010235 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0004264 | 0.001706 | 0.000853 | 0.000853 | 0 | 0.000426 | 0.000853 | 0.000853 | 0.001706 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0008529 | 0 | 0.000426 | 0 | 0.000853 | 0 | 0 | 0.002132 | 0.002132 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000426 | 0.000426 | 0.000853 | 0 | 0 | 0 | 0.000426 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.001279 | 0 | 0 | 0 | 0 | 0.000426 | 0.000426 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000426 | 0 | 0.000853 | 0 | 0.001279 | 0.000853 | 0.000426 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000853 | 0 | 0.001279 | 0.011514 | 0.011514 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | |
| **Industry:** | **Cement Pipe** | | | | | | | | | | | | | | | |
| **Operation:** | **Product Forming** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0.006654 | 0.016438 | 0.087671 | 0.130333 | 0.1561644 | 0.0544031 | 0.02818 | 0.030137 | 0.019961 | 0.017221 | 0.007045 | 0.018787 | 0.020352 | 0.010959 |
| **0.1-0.2** | 0 | 0 | 0 | 0 | 0.009002 | 0.051663 | 0.0375734 | 0.0258317 | 0.016047 | 0.018395 | 0.010568 | 0.012524 | 0.00274 | 0.012133 | 0.010568 | 0.009393 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0 | 0.013307 | 0.0180039 | 0.0152642 | 0.010568 | 0.008611 | 0.006262 | 0.004697 | 0.001957 | 0.005871 | 0.007436 | 0.004305 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0054795 | 0.0035225 | 0.00274 | 0.00274 | 0.00274 | 0.002348 | 0.001174 | 0.003523 | 0.005088 | 0.001566 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0003914 | 0.0039139 | 0.003523 | 0.004305 | 0.002348 | 0.001957 | 0.001566 | 0.004697 | 0.004305 | 0.007436 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0003914 | 0.000391 | 0 | 0 | 0.001174 | 0 | 0.000391 | 0.000783 | 0.000783 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000391 | 0 | 0.000783 | 0.000783 | 0.000783 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000391 | 0 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000391 | 0 | 0 | 0 | 0.001174 | 0.000783 | 0 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000391 | 0.000391 | 0.000783 | 0.001566 | 0.005088 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Chrysotile** | | | | | | | | | | | | | | | |
| **Industry:** | **Cement Pipe** | | | | | | | | | | | | | | | |
| **Operation:** | **Product Finishing** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0.001651 | 0.049732 | 0.06851 | 0.175815 | 0.180974 | 0.1035906 | 0.0468428 | 0.02662 | 0.01527 | 0.00908 | 0.008048 | 0.005365 | 0.008254 | 0.010937 | 0.003508 |
| **0.1-0.2** | 0 | 0 | 0 | 0.001444 | 0.011143 | 0.058605 | 0.0313661 | 0.0183657 | 0.014239 | 0.009286 | 0.006191 | 0.005159 | 0.005365 | 0.003921 | 0.004953 | 0.003095 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0 | 0.014032 | 0.0113496 | 0.0074288 | 0.005984 | 0.010318 | 0.006603 | 0.002889 | 0.000825 | 0.00227 | 0.004127 | 0.002889 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0.001032 | 0.0020636 | 0.0030953 | 0.003302 | 0.000619 | 0.001032 | 0.001238 | 0.001032 | 0.000825 | 0.00454 | 0.001032 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0.0002064 | 0.0008254 | 0.000413 | 0.000413 | 0.001238 | 0.001032 | 0.000206 | 0.002476 | 0.001857 | 0.007429 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000206 | 0 | 0 | 0.000413 | 0.000206 | 0 | 0 | 0.000206 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000413 | 0.000206 | 0.000413 | 0.000619 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000206 | 0 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000619 | 0 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000206 | 0 | 0 | 0.000413 | 0.000413 | 0.000413 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000413 | 0.002683 |

## BINS OF INTEREST BY OPERATION

| | | | | |
|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | *Index 19* |
| **Fiber Type:** | **Chrysotile** | | | |
| **Industry:** | **Cement Pipe** | | | |
| **Operation:** | **Mixing** | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7471 | 0.0273 | 0.0235 | 0.0733 |
| 0.25<w<0.4 | 0.0951 | 0.0145 | 0.0098 | |
| w < 0.4 | 0.8422 | 0.0418 | 0.0333 | |
| w > 0.4 | 0.0337 | 0.0222 | 0.0269 | |
| CHECK | 1.0000 | | | |

| | | | | |
|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | *Index 20* |
| **Fiber Type:** | **Chrysotile** | | | |
| **Industry:** | **Cement Pipe** | | | |
| **Operation:** | **Product Forming** | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8117 | 0.0346 | 0.0225 | 0.0352 |
| 0.25<w<0.4 | 0.0665 | 0.0088 | 0.0037 | |
| w < 0.4 | 0.8783 | 0.0434 | 0.0262 | |
| w > 0.4 | 0.0294 | 0.0086 | 0.0141 | |
| CHECK | 1.0000 | | | |

| | | | | |
|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | *Index 21* |
| **Fiber Type:** | **Chrysotile** | | | |
| **Industry:** | **Cement Pipe** | | | |
| **Operation:** | **Product Finishing** | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8957 | 0.0180 | 0.0080 | 0.0243 |
| 0.25<w<0.4 | 0.0451 | 0.0066 | 0.0025 | |
| w < 0.4 | 0.9408 | 0.0246 | 0.0105 | |
| w > 0.4 | 0.0089 | 0.0039 | 0.0113 | |
| CHECK | 1.0000 | | | |

## BINS OF INTEREST ACROSS OPERATIONS

| | | | | |
|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | *Index* |
| **Fiber Type:** | **Chrysotile** | | | *19, 20, 21* |
| **Industry:** | **Cement Pipe** | | | |
| **Operation:** | **All Operations** | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

NOTE: For the purposes of assigning bins with a width cutoff of 0.25 um, a factor of 0.50 was assumed.

**RAW DATA TABLES AS PRESENTED IN DEMENT AND HARRIS 1979**

| | | | | | | | | | | | | | | | | Total | 373 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-10** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Amosite** | | | | | | | | | | | | | | | | |
| **Industry:** | **Pipe Insulation Mfg.** | | | | | | | | | | | | | | | | |
| **Operation:** | **Mixing** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | |
| **0.08** | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 3 | 3 | 1 | 2 | 4 | 1 | 0 | 3 | 0 | |
| **0.15** | 0 | 0 | 0 | 0 | 0 | 8 | 10 | 5 | 4 | 3 | 5 | 5 | 2 | 1 | 9 | 4 | |
| **0.25** | 0 | 0 | 0 | 0 | 0 | 3 | 8 | 5 | 4 | 7 | 4 | 4 | 2 | 3 | 10 | 7 | |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 5 | 1 | 4 | 3 | 3 | 4 | 15 | 4 | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 11 | 10 | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 2 | 4 | 1 | 1 | 2 | 3 | 7 | 8 | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | 4 | 3 | 1 | 3 | 11 | 9 | 9 | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 4 | 2 | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 4 | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 0 | 1 | 2 | 2 | 7 | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 2 | 6 | 19 | |

| | | | | | | | | | | | | | | | | Total | 277 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-11** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Amosite** | | | | | | | | | | | | | | | | |
| **Industry:** | **Pipe Insulation Mfg.** | | | | | | | | | | | | | | | | |
| **Operation:** | **Forming** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | |
| **0.08** | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 0 | |
| **0.15** | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 5 | 2 | 4 | 3 | 3 | 3 | 1 | 6 | 1 | |
| **0.25** | 0 | 0 | 0 | 0 | 0 | 3 | 8 | 9 | 6 | 2 | 3 | 5 | 3 | 3 | 10 | 8 | |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 2 | 3 | 2 | 4 | 2 | 4 | 6 | 9 | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 7 | 2 | 2 | 2 | 0 | 0 | 7 | 5 | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 1 | 2 | 3 | 1 | 1 | 3 | 5 | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 1 | 1 | 0 | 0 | 2 | 4 | 4 | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 1 | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 2 | 6 | 15 | |

| | | | | | | | | | | | | | | | | Total | 229 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-12** | | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Amosite** | | | | | | | | | | | | | | | | |
| **Industry:** | **Pipe Insulation Mfg.** | | | | | | | | | | | | | | | | |
| **Operation:** | **Finishing** | | | | | | | | | | | | | | | | |
| **Fiber Size Interval** | **Midpoint (Micrometers)** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.05** | **0.15** | **0.25** | **0.35** | **0.45** | **0.75** | **1.25** | **1.75** | **2.25** | **2.75** | **3.25** | **3.75** | **4.25** | **4.75** | **7.5** | **15** | |
| **0.08** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| **0.15** | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 3 | 6 | 3 | 3 | 2 | 1 | 5 | 0 | |
| **0.25** | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 5 | 7 | 4 | 2 | 3 | 4 | 4 | 9 | 1 | |
| **0.35** | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 0 | 3 | 0 | 0 | 3 | 4 | 6 | 3 | |
| **0.45** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 1 | 0 | 1 | 0 | 0 | 6 | 1 | |
| **0.55** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 1 | 3 | 4 | 2 | 2 | 3 | 3 | 3 | |
| **0.65** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 1 | 3 | 2 | 5 | 6 | 4 | |
| **0.75** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 4 | 0 | 2 | 2 | 3 | |
| **0.85** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 2 | 2 | |
| **0.95** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | |
| **1.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 7 | 15 | |

**DATA NORMALIZED TO 100**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Amosite** | | | | | | | | | | | | | | | |
| **Industry:** | **Pipe Insulation Mfg.** | | | | | | | | | | | | | | | |
| **Operation:** | **Mixing** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0 | 0 | 0 | 0.005362 | 0.010724 | 0.008043 | 0.008043 | 0.002681 | 0.005362 | 0.010724 | 0.002681 | 0 | 0.008043 | 0 |
| **0.1-0.2** | 0 | 0 | 0 | 0 | 0 | 0.021448 | 0.02681 | 0.013405 | 0.010724 | 0.008043 | 0.013405 | 0.013405 | 0.005362 | 0.002681 | 0.024129 | 0.010724 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0 | 0.008043 | 0.021448 | 0.013405 | 0.010724 | 0.018767 | 0.010724 | 0.010724 | 0.005362 | 0.008043 | 0.02681 | 0.018767 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0.002681 | 0.005362 | 0.005362 | 0.013405 | 0.002681 | 0.010724 | 0.008043 | 0.008043 | 0.010724 | 0.040214 | 0.010724 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0.008043 | 0.008043 | 0.005362 | 0.005362 | 0.002681 | 0.005362 | 0.005362 | 0.002681 | 0.029491 | 0.02681 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.008043 | 0.005362 | 0.005362 | 0.010724 | 0.002681 | 0.002681 | 0.005362 | 0.008043 | 0.018767 | 0.021448 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.013405 | 0.010724 | 0.010724 | 0.008043 | 0.002681 | 0.008043 | 0.029491 | 0.024129 | 0.024129 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.002681 | 0.002681 | 0 | 0.005362 | 0.002681 | 0.002681 | 0 | 0.010724 | 0.005362 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.002681 | 0.002681 | 0.002681 | 0.002681 | 0.005362 | 0.010724 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.002681 | 0 | 0.002681 | 0.008043 | 0 | 0.002681 | 0.005362 | 0.005362 | 0.018767 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.002681 | 0.002681 | 0.005362 | 0.010724 | 0.005362 | 0.016086 | 0.050938 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Amosite** | | | | | | | | | | | | | | | |
| **Industry:** | **Pipe Insulation Mfg.** | | | | | | | | | | | | | | | |
| **Operation:** | **Forming** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0 | 0 | 0 | 0 | 0.01083 | 0.021661 | 0.00361 | 0.00722 | 0.00361 | 0.00722 | 0.00722 | 0.00361 | 0.00361 | 0 |
| **0.1-0.2** | 0 | 0 | 0 | 0 | 0 | 0.01083 | 0.021661 | 0.018051 | 0.00722 | 0.01444 | 0.01083 | 0.01083 | 0.01083 | 0.00361 | 0.021661 | 0.00361 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0 | 0.01083 | 0.028881 | 0.032491 | 0.021661 | 0.00722 | 0.01083 | 0.018051 | 0.01083 | 0.01083 | 0.036101 | 0.028881 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0 | 0.01444 | 0.01083 | 0.00722 | 0.01083 | 0.00722 | 0.01444 | 0.00722 | 0.01444 | 0.021661 | 0.032491 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0.01444 | 0.00361 | 0.025271 | 0.00722 | 0.00722 | 0.00722 | 0 | 0 | 0.025271 | 0.018051 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00361 | 0.01083 | 0.01083 | 0.00361 | 0.00722 | 0.01083 | 0.00361 | 0.00361 | 0.01083 | 0.018051 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00361 | 0.01444 | 0.00722 | 0.00361 | 0.00361 | 0 | 0 | 0.00722 | 0.01444 | 0.01444 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00722 | 0.00361 | 0 | 0 | 0 | 0 | 0.00722 | 0.01083 | 0.01083 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00361 | 0.00361 | 0 | 0.00722 | 0.00361 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00361 | 0.00361 | 0 | 0 | 0.00361 | 0.00722 | 0.00361 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00361 | 0.00722 | 0 | 0.00722 | 0.00722 | 0.021661 | 0.054152 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Amosite** | | | | | | | | | | | | | | | |
| **Industry:** | **Pipe Insulation Mfg.** | | | | | | | | | | | | | | | |
| **Operation:** | **Finishing** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-1** | **1-1.5** | **1.5-2** | **2-2.5** | **2.5-3** | **3-3.5** | **3.5-4** | **4-4.5** | **4.5-5** | **5-10** | **>10** |
| **0.05-0.1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.004367 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.1-0.2** | 0 | 0 | 0 | 0 | 0 | 0.008734 | 0.0131 | 0.0131 | 0.0131 | 0.026201 | 0.0131 | 0.0131 | 0.008734 | 0.004367 | 0.021834 | 0 |
| **0.2-0.3** | 0 | 0 | 0 | 0 | 0 | 0 | 0.026201 | 0.021834 | 0.030568 | 0.017467 | 0.008734 | 0.0131 | 0.017467 | 0.017467 | 0.039301 | 0.004367 |
| **0.3-0.4** | 0 | 0 | 0 | 0 | 0 | 0.004367 | 0.004367 | 0.021834 | 0 | 0.0131 | 0 | 0 | 0.0131 | 0.017467 | 0.026201 | 0.0131 |
| **0.4-0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0.004367 | 0.0131 | 0.0131 | 0.004367 | 0 | 0.004367 | 0 | 0 | 0.026201 | 0.004367 |
| **0.5-0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.004367 | 0.026201 | 0.004367 | 0.0131 | 0.017467 | 0.008734 | 0.008734 | 0.0131 | 0.0131 | 0.0131 |
| **0.6-0.7** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.008734 | 0.008734 | 0.0131 | 0.004367 | 0.0131 | 0.008734 | 0.021834 | 0.026201 | 0.017467 |
| **0.7-0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.004367 | 0 | 0.008734 | 0.017467 | 0 | 0.008734 | 0.008734 | 0.0131 |
| **0.8-0.9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.008734 | 0 | 0.004367 | 0 | 0.004367 | 0.008734 | 0.008734 |
| **0.9-1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.004367 | 0.004367 | 0 | 0.004367 | 0.004367 |
| **>1.0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.008734 | 0.008734 | 0 | 0.008734 | 0.030568 | 0.065502 |

## BINS OF INTEREST BY OPERATION

**Reference:** **Dement and Harris 1979** *Index 22*
**Fiber Type:** **Amosite**
**Industry:** **Pipe Insulation Mfg.**
**Operation:** **Mixing**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.2225 | 0.0456 | 0.0201 | 0.3418 |
| 0.25<w<0.4 | 0.1206 | 0.0536 | 0.0201 | |
| w < 0.4 | 0.3432 | 0.0992 | 0.0402 | |
| w > 0.4 | 0.2493 | 0.1099 | 0.1582 | |
| CHECK | 1.0000 | | | |

**Reference:** **Dement and Harris 1979** *Index 23*
**Fiber Type:** **Amosite**
**Industry:** **Pipe Insulation Mfg.**
**Operation:** **Forming**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.2491 | 0.0433 | 0.0181 | 0.3069 |
| 0.25<w<0.4 | 0.1625 | 0.0397 | 0.0469 | |
| w < 0.4 | 0.4116 | 0.0830 | 0.0650 | |
| w > 0.4 | 0.2202 | 0.0975 | 0.1227 | |
| CHECK | 1.0000 | | | |

**Reference:** **Dement and Harris 1979** *Index 24*
**Fiber Type:** **Amosite**
**Industry:** **Pipe Insulation Mfg.**
**Operation:** **Finishing**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.1943 | 0.0415 | 0.0022 | 0.3057 |
| 0.25<w<0.4 | 0.1507 | 0.0459 | 0.0153 | |
| w < 0.4 | 0.3450 | 0.0873 | 0.0175 | |
| w > 0.4 | 0.3057 | 0.1179 | 0.1266 | |
| CHECK | 1.0000 | | | |

## BINS OF INTEREST ACROSS OPERATIONS

**Reference:** **Dement and Harris 1979** *Index 22, 23, 24*
**Fiber Type:** **Amosite**
**Industry:** **Pipe Insulation Mfg.**
**Operation:** **All Operations**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.2220 | 0.0435 | 0.0134 | 0.3181 |
| 0.25<w<0.4 | 0.1446 | 0.0464 | 0.0274 | |
| w < 0.4 | 0.3666 | 0.0899 | 0.0409 | |
| w > 0.4 | 0.2584 | 0.1084 | 0.1359 | |

NOTE: No information is provided by the authors to allow for splitting bins. For the purposes of assigning bins with a width cutoff of 0.25 um, a factor of 0.50 was assumed.

**RAW DATA PRESENTED IN DEMENT AND HARRIS 1979**

| | | | | | | | | | | | | | | | Total | 241 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-15** | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Tremolite** | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | |
| | **Fiber Size Interval Midpoint (Micrometers)** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.15** | **0.44** | **0.74** | **1.03** | **1.32** | **1.62** | **1.91** | **2.2** | **2.5** | **2.79** | **3.23** | **3.82** | **4.41** | **5** | **5.59** | **15** |
| **0.03** | 2 | 10 | 2 | 5 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.09** | 0 | 13 | 5 | 10 | 6 | 1 | 2 | 3 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| **0.15**[a] | 0 | 3 | 7 | 9 | 11 | 4 | 8 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **0.20** | 0 | 0 | 2 | 5 | 8 | 4 | 4 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| **0.26** | 0 | 0 | 2 | 3 | 6 | 4 | 5 | 2 | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 0 |
| **0.32** | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 4 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| **0.38** | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 4 | 3 | 1 | 0 | 2 | 0 | 0 | 0 | 1 |
| **0.44** | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 2 | 2 | 0 | 2 | 2 | 1 | 0 | 0 | 0 |
| **0.50** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| **0.56** | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 3 | 1 | 4 | 3 | 0 | 0 | 0 | 1 |
| **0.80** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 2 | 2 | 0 | 3 | 0 |

**Notes:**

[a] Table C-15 (Dement and Harris, 1979) lists the midpoint of this bin as 0.05. This appears to be a typo as the bins would overlap if that were the case. OSWER assumed that the midpoint of this bin was supposed to be 0.15. For use in calculations, this does not effect the overall result as the bin cut-off specified in the OSWER analysis is w < 0.4 um.

**DATA NORMALIZED TO 100**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Tremolite** | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5.28** | **5.28-5.9** | **>6** |
| **0-0.06** | 0.0082988 | 0.0414938 | 0.0082988 | 0.0207469 | 0.0082988 | 0.0041494 | 0.0041494 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.06-0.12** | 0 | 0.0539419 | 0.0207469 | 0.0414938 | 0.0248963 | 0.0041494 | 0.0082988 | 0.0124481 | 0.0082988 | 0 | 0.0041494 | 0 | 0 | 0.0041494 | 0 | 0 |
| **0.12-0.17** | 0 | 0.0124481 | 0.0290456 | 0.0373444 | 0.0456432 | 0.0165975 | 0.033195 | 0.0082988 | 0 | 0 | 0.0041494 | 0 | 0 | 0 | 0 | 0 |
| **0.17-0.23** | 0 | 0 | 0.0082988 | 0.0207469 | 0.033195 | 0.0165975 | 0.0165975 | 0.0041494 | 0.0124481 | 0.0041494 | 0.0041494 | 0 | 0 | 0 | 0 | 0 |
| **0.23-0.29** | 0 | 0 | 0.0082988 | 0.0124481 | 0.0248963 | 0.0165975 | 0.0207469 | 0.0082988 | 0 | 0.0041494 | 0 | 0.0082988 | 0 | 0 | 0.0041494 | 0 |
| **0.29-0.35** | 0 | 0 | 0 | 0.0041494 | 0.0041494 | 0.0124481 | 0 | 0.0165975 | 0.0082988 | 0 | 0.0041494 | 0 | 0 | 0 | 0.0041494 | 0 |
| **0.35-0.41** | 0 | 0 | 0 | 0 | 0.0082988 | 0.0041494 | 0.0041494 | 0.0165975 | 0.0124481 | 0.0041494 | 0 | 0.0082988 | 0 | 0 | 0 | 0.0041494 |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0 | 0.0082988 | 0.0165975 | 0.0082988 | 0.0082988 | 0 | 0.0082988 | 0.0082988 | 0.0041494 | 0 | 0 | 0 |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0041494 | 0 |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.0041494 | 0.0082988 | 0.0041494 | 0.0124481 | 0.0041494 | 0.0165975 | 0.0124481 | 0 | 0 | 0 | 0.0041494 |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0082988 | 0.0124481 | 0.0082988 | 0.0082988 | 0.0082988 | 0 | 0.0124481 | 0 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Tremolite** | | | | | | | | | | | | | | 0.5 | length |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | 0.667 | width |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | 0.833 | width |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5.28** | **5.28-5.9** | **5.9-24.1** |
| **0-0.06** | 0.0082988 | 0.0414938 | 0.0082988 | 0.0207469 | 0.0082988 | 0.0041494 | 0.0041494 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.06-0.12** | 0 | 0.0539419 | 0.0207469 | 0.0414938 | 0.0248963 | 0.0041494 | 0.0082988 | 0.0124481 | 0.0082988 | 0 | 0.0041494 | 0 | 0 | 0.0041494 | 0 | 0 |
| **0.12-0.17** | 0 | 0.0124481 | 0.0290456 | 0.0373444 | 0.0456432 | 0.0165975 | 0.033195 | 0.0082988 | 0 | 0 | 0.0041494 | 0 | 0 | 0 | 0 | 0 |
| **0.17-0.23** | 0 | 0 | 0.0082988 | 0.0207469 | 0.033195 | 0.0165975 | 0.0165975 | 0.0041494 | 0.0124481 | 0.0041494 | 0.0041494 | 0 | 0 | 0 | 0 | 0 |
| **0.23-0.25** | 0 | 0 | 0.0027663 | 0.0041494 | 0.0082988 | 0.0055325 | 0.0069156 | 0.0027663 | 0 | 0.0013831 | 0 | 0.0027663 | 0 | 0 | 0.0013831 | 0 |
| **0.25-0.29** | 0 | 0 | 0.0055325 | 0.0082988 | 0.0165975 | 0.011065 | 0.0138313 | 0.0055325 | 0 | 0.0027663 | 0 | 0.0055325 | 0 | 0 | 0.0027663 | 0 |
| **0.29-0.35** | 0 | 0 | 0 | 0.0041494 | 0.0041494 | 0.0124481 | 0 | 0.0165975 | 0.0082988 | 0 | 0.0041494 | 0 | 0 | 0 | 0.0041494 | 0 |
| **0.35-0.40** | 0 | 0 | 0 | 0 | 0.0069156 | 0.0034578 | 0.0034578 | 0.0138313 | 0.0103734 | 0.0034578 | 0 | 0.0069156 | 0 | 0 | 0 | 0.0034578 |
| **0.40-0.41** | 0 | 0 | 0 | 0 | 0.0013831 | 0.0006916 | 0.0006916 | 0.0027663 | 0.0020747 | 0.0006916 | 0 | 0.0013831 | 0 | 0 | 0 | 0.0006916 |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0 | 0.0082988 | 0.0165975 | 0.0082988 | 0.0082988 | 0 | 0.0082988 | 0.0082988 | 0.0041494 | 0 | 0 | 0 |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0041494 | 0 |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.0041494 | 0.0082988 | 0.0041494 | 0.0124481 | 0.0041494 | 0.0165975 | 0.0124481 | 0 | 0 | 0 | 0.0041494 |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0082988 | 0.0124481 | 0.0082988 | 0.0082988 | 0.0082988 | 0 | 0.0124481 | 0 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | | Total | 1.00 | |
| **Fiber Type:** | **Tremolite** | | | | | | | | | | | | | | | 0.5 | length | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | 0.775 | length | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | 0.667 | width | |
| | | | | | | | | | | | | | | | | 0.833 | width | |
| | **Length (um)** | | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5.0** | **5-5.28** | **5.28-5.9** | **5.9-10** | **>10** |
| **0-0.06** | 0.0082988 | 0.0414938 | 0.0082988 | 0.0207469 | 0.0082988 | 0.0041494 | 0.0041494 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.06-0.12** | 0 | 0.0539419 | 0.0207469 | 0.0414938 | 0.0248963 | 0.0041494 | 0.0082988 | 0.0124481 | 0.0082988 | 0 | 0.0041494 | 0 | 0 | 0.0020747 | 0.0020747 | 0 | 0 | 0 |
| **0.12-0.17** | 0 | 0.0124481 | 0.0290456 | 0.0373444 | 0.0456432 | 0.0165975 | 0.033195 | 0.0082988 | 0 | 0 | 0.0041494 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.17-0.23** | 0 | 0 | 0.0082988 | 0.0207469 | 0.033195 | 0.0165975 | 0.0165975 | 0.0041494 | 0.0124481 | 0.0041494 | 0.0041494 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.23-0.25** | 0 | 0 | 0.0027663 | 0.0041494 | 0.0082988 | 0.0055325 | 0.0069156 | 0.0027663 | 0 | 0.0013831 | 0 | 0.0027663 | 0 | 0 | 0 | 0.0013831 | 0 | 0 |
| **0.25-0.29** | 0 | 0 | 0.0055325 | 0.0082988 | 0.0165975 | 0.011065 | 0.0138313 | 0.0055325 | 0 | 0.0027663 | 0 | 0.0055325 | 0 | 0 | 0 | 0.0027663 | 0 | 0 |
| **0.29-0.35** | 0 | 0 | 0 | 0.0041494 | 0.0041494 | 0.0124481 | 0 | 0.0165975 | 0.0082988 | 0 | 0.0041494 | 0 | 0 | 0 | 0 | 0.0041494 | 0 | 0 |
| **0.35-0.40** | 0 | 0 | 0 | 0 | 0.0069156 | 0.0034578 | 0.0034578 | 0.0138313 | 0.0103734 | 0.0034578 | 0 | 0.0069156 | 0 | 0 | 0 | 0 | 0.000779 | 0.002679 |
| **0.40-0.41** | 0 | 0 | 0 | 0 | 0.0013831 | 0.0006916 | 0.0006916 | 0.0027663 | 0.0020747 | 0.0006916 | 0 | 0.0013831 | 0 | 0 | 0 | 0 | 0.000156 | 0.000536 |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0 | 0.0082988 | 0.0165975 | 0.0082988 | 0.0082988 | 0 | 0.0082988 | 0.0082988 | 0.0041494 | 0 | 0 | 0 | 0 | 0 |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0041494 | 0 | 0 |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.0041494 | 0.0082988 | 0.0041494 | 0.0124481 | 0.0041494 | 0.0165975 | 0.0124481 | 0 | 0 | 0 | 0 | 0.000935 | 0.003215 |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0082988 | 0.0124481 | 0.0082988 | 0.0082988 | 0.0082988 | 0 | 0 | 0.0124481 | 0 | 0 |

## BINS OF INTEREST BY OPERATION

**Reference:** **Dement and Harris 1979** *Index 27*
**Fiber Type:** **Tremolite**
**Industry:** **Talc Production**
**Operation:** **Mining and Milling**

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.6176 | 0.0035 | 0.0000 | 0.0318 |
| 0.25<w<0.4 | 0.1674 | 0.0077 | 0.0027 | |
| w < 0.4 | 0.7849 | 0.0112 | 0.0027 | |
| w > 0.4 | 0.1798 | 0.0177 | 0.0038 | |

**RAW DATA PRESENTED IN DEMENT AND HARRIS 1979**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-13** | | | | | | | | | | | | | | Total | 849 |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.15** | **0.44** | **0.74** | **1.03** | **1.32** | **1.62** | **1.91** | **2.2** | **2.5** | **2.79** | **3.23** | **3.82** | **4.41** | **5** | **5.59** | **15** |
| **0.03** | 11 | 80 | 38 | 19 | 26 | 7 | 9 | 5 | 0 | 2 | 1 | 0 | 2 | 0 | 0 | 0 |
| **0.09** | 1 | 48 | 52 | 26 | 17 | 15 | 6 | 5 | 7 | 1 | 3 | 1 | 2 | 0 | 2 | 1 |
| **0.15**[a] | 0 | 12 | 20 | 27 | 23 | 13 | 8 | 6 | 6 | 5 | 5 | 1 | 4 | 0 | 4 | 2 |
| **0.2** | 0 | 0 | 2 | 9 | 13 | 9 | 9 | 7 | 2 | 4 | 5 | 3 | 2 | 0 | 4 | 3 |
| **0.26** | 0 | 0 | 5 | 5 | 11 | 14 | 9 | 10 | 6 | 6 | 11 | 0 | 3 | 1 | 6 | 0 |
| **0.32** | 0 | 0 | 0 | 0 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 1 |
| **0.38** | 0 | 0 | 1 | 0 | 3 | 4 | 1 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | 0 | 10 |
| **0.44** | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 1 | 5 | 4 | 2 | 0 | 2 | 0 | 5 | 2 |
| **0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| **0.56** | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 4 | 2 | 4 | 4 | 5 | 5 | 4 | 4 |
| **0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 6 | 2 | 0 | 22 | 8 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979 Table C-14** | | | | | | | | | | | | | | Total | 318 |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0.15** | **0.44** | **0.74** | **1.03** | **1.32** | **1.62** | **1.91** | **2.2** | **2.5** | **2.79** | **3.23** | **3.82** | **4.41** | **5** | **5.59** | **15** |
| **0.03** | 5 | 11 | 11 | 5 | 6 | 1 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.09** | 0 | 13 | 14 | 11 | 5 | 5 | 7 | 2 | 2 | 3 | 0 | 1 | 1 | 1 | 0 | 0 |
| **0.15**[a] | 0 | 5 | 13 | 14 | 10 | 8 | 5 | 2 | 0 | 1 | 2 | 4 | 2 | 0 | 3 | 0 |
| **0.2** | 0 | 0 | 5 | 1 | 4 | 4 | 4 | 5 | 1 | 3 | 3 | 0 | 4 | 3 | 0 | 0 |
| **0.26** | 0 | 0 | 6 | 5 | 2 | 4 | 3 | 1 | 1 | 4 | 3 | 0 | 1 | 0 | 2 | 1 |
| **0.32** | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| **0.38** | 0 | 0 | 0 | 0 | 2 | 2 | 6 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 2 | 4 |
| **0.44** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| **0.5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.56** | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 2 | 3 | 4 | 2 | 2 | 0 | 4 | 2 |
| **0.8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 4 | 7 |

**Notes:**

[a] Tables C-13 and C-14 (Dement and Harris, 1979) lists the midpoint of this bin as 0.05. This appears to be a typo as the bins would overlap if that were the case. OSWER assumed that the midpoint of this bin was supposed to be 0.15. For use in calculations, this does not effect the overall result as the bin cut-off specified in the OSWER analysis is w < 0.4 um.

**DATA NORMALIZED TO 100**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | | 1.00 |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5.28** | **5.28-5.9** | **>6** |
| **0-0.06** | 0.012956 | 0.094229 | 0.044759 | 0.022379 | 0.030624 | 0.008245 | 0.010601 | 0.005889 | 0 | 0.002356 | 0.001178 | 0 | 0.002356 | 0 | 0 | 0 |
| **0.06-0.12** | 0.001178 | 0.056537 | 0.061249 | 0.030624 | 0.020024 | 0.017668 | 0.007067 | 0.005889 | 0.008245 | 0.001178 | 0.003534 | 0.001178 | 0.002356 | 0 | 0.002356 | 0.001178 |
| **0.12-0.17** | 0 | 0.014134 | 0.023557 | 0.031802 | 0.027091 | 0.015312 | 0.009423 | 0.007067 | 0.007067 | 0.005889 | 0.005889 | 0.001178 | 0.004711 | 0 | 0.004711 | 0.002356 |
| **0.17-0.23** | 0 | 0 | 0.002356 | 0.010601 | 0.015312 | 0.010601 | 0.010601 | 0.008245 | 0.002356 | 0.004711 | 0.005889 | 0.003534 | 0.002356 | 0 | 0.004711 | 0.003534 |
| **0.23-0.29** | 0 | 0 | 0.005889 | 0.005889 | 0.012956 | 0.01649 | 0.010601 | 0.011779 | 0.007067 | 0.007067 | 0.012956 | 0 | 0.003534 | 0.001178 | 0.007067 | 0 |
| **0.29-0.35** | 0 | 0 | 0 | 0 | 0.003534 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.001178 | 0.002356 | 0.003534 | 0.001178 |
| **0.35-0.41** | 0 | 0 | 0.001178 | 0 | 0.003534 | 0.004711 | 0.001178 | 0.003534 | 0.003534 | 0.002356 | 0.003534 | 0.001178 | 0.002356 | 0.003534 | 0 | 0.011779 |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0.002356 | 0.003534 | 0 | 0.001178 | 0.005889 | 0.004711 | 0.002356 | 0 | 0.002356 | 0 | 0.005889 | 0.002356 |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.001178 | 0 | 0 | 0.001178 | 0 | 0.001178 | 0 |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.002356 | 0 | 0.001178 | 0.004711 | 0.002356 | 0.004711 | 0.004711 | 0.005889 | 0.005889 | 0.004711 | 0.004711 |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.003534 | 0.002356 | 0.007067 | 0.002356 | 0 | 0.025913 | 0.009423 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | | |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5.28** | **5.28-5.9** | **>6** |
| **0-0.06** | 0.015723 | 0.034591 | 0.034591 | 0.015723 | 0.018868 | 0.003145 | 0.003145 | 0.006289 | 0 | 0.006289 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.06-0.12** | 0 | 0.040881 | 0.044025 | 0.034591 | 0.015723 | 0.015723 | 0.022013 | 0.006289 | 0.006289 | 0.009434 | 0 | 0.003145 | 0.003145 | 0.003145 | 0 | 0 |
| **0.12-0.17** | 0 | 0.015723 | 0.040881 | 0.044025 | 0.031447 | 0.025157 | 0.015723 | 0.006289 | 0 | 0.003145 | 0.006289 | 0.012579 | 0.006289 | 0 | 0.009434 | 0 |
| **0.17-0.23** | 0 | 0 | 0.015723 | 0.003145 | 0.012579 | 0.012579 | 0.012579 | 0.015723 | 0.003145 | 0.009434 | 0.009434 | 0 | 0.012579 | 0.009434 | 0 | 0 |
| **0.23-0.29** | 0 | 0 | 0.018868 | 0.015723 | 0.006289 | 0.012579 | 0.009434 | 0.003145 | 0.003145 | 0.012579 | 0.009434 | 0 | 0.003145 | 0 | 0.006289 | 0.003145 |
| **0.29-0.35** | 0 | 0 | 0 | 0 | 0.009434 | 0 | 0 | 0.009434 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0.003145 |
| **0.35-0.41** | 0 | 0 | 0 | 0 | 0.006289 | 0.006289 | 0.018868 | 0.006289 | 0.003145 | 0.003145 | 0.006289 | 0 | 0 | 0 | 0.006289 | 0.012579 |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0 | 0.003145 | 0.003145 | 0 | 0 | 0.003145 | 0.003145 |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.006289 | 0 | 0.003145 | 0.006289 | 0.009434 | 0.012579 | 0.006289 | 0.006289 | 0 | 0.012579 | 0.006289 |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0.003145 | 0 | 0.012579 | 0.022013 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | | Total | 1.00 |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | 0.667 | width |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | 0.833 | width |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5.28** | **5.28-5.9** | **5.9-24.1** | |
| **0-0.06** | 0.012956 | 0.094229 | 0.044759 | 0.022379 | 0.030624 | 0.008245 | 0.010601 | 0.005889 | 0 | 0.002356 | 0.001178 | 0 | 0.002356 | 0 | 0 | 0 | |
| **0.06-0.12** | 0.001178 | 0.056537 | 0.061249 | 0.030624 | 0.020024 | 0.017668 | 0.007067 | 0.005889 | 0.008245 | 0.001178 | 0.003534 | 0.001178 | 0.002356 | 0 | 0.002356 | 0.001178 | |
| **0.12-0.17** | 0 | 0.014134 | 0.023557 | 0.031802 | 0.027091 | 0.015312 | 0.009423 | 0.007067 | 0.007067 | 0.005889 | 0.005889 | 0.001178 | 0.004711 | 0 | 0.004711 | 0.002356 | |
| **0.17-0.23** | 0 | 0 | 0.002356 | 0.010601 | 0.015312 | 0.010601 | 0.010601 | 0.008245 | 0.002356 | 0.004711 | 0.005889 | 0.003534 | 0.002356 | 0 | 0.004711 | 0.003534 | |
| **0.23-0.25** | 0 | 0 | 0.001963 | 0.001963 | 0.004319 | 0.005497 | 0.003534 | 0.003926 | 0.002356 | 0.002356 | 0.004319 | 0 | 0.001178 | 0.000393 | 0.002356 | 0 | |
| **0.25-0.29** | 0 | 0 | 0.003926 | 0.003926 | 0.008638 | 0.010993 | 0.007067 | 0.007852 | 0.004711 | 0.004711 | 0.008638 | 0 | 0.002356 | 0.000785 | 0.004711 | 0 | |
| **0.29-0.35** | 0 | 0 | 0 | 0 | 0.003534 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.001178 | 0.002356 | 0.003534 | 0.001178 | |
| **0.35-0.40** | 0 | 0 | 0.000982 | 0 | 0.002945 | 0.003926 | 0.000982 | 0.002945 | 0.002945 | 0.001963 | 0.002945 | 0.000982 | 0.001963 | 0.002945 | 0 | 0.009815 | |
| **0.40-0.41** | 0 | 0 | 0.000196 | 0 | 0.000589 | 0.000785 | 0.000196 | 0.000589 | 0.000589 | 0.000393 | 0.000589 | 0.000196 | 0.000393 | 0.000589 | 0 | 0.001963 | |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0.002356 | 0.003534 | 0 | 0.001178 | 0.005889 | 0.004711 | 0.002356 | 0 | 0.002356 | 0 | 0.005889 | 0.002356 | |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.001178 | 0 | 0 | 0.001178 | 0 | 0.001178 | 0 | |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.002356 | 0 | 0.001178 | 0.004711 | 0.002356 | 0.004711 | 0.004711 | 0.005889 | 0.005889 | 0.004711 | 0.004711 | |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.003534 | 0.002356 | 0.007067 | 0.002356 | 0 | 0.025913 | 0.009423 | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | | total | 1.00 |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5.28** | **5.28-5.9** | **5.9-24.1** | |
| **0-0.06** | 0.015723 | 0.034591 | 0.034591 | 0.015723 | 0.018868 | 0.003145 | 0.003145 | 0.006289 | 0 | 0.006289 | 0 | 0 | 0 | 0 | 0 | 0 | |
| **0.06-0.12** | 0 | 0.040881 | 0.044025 | 0.034591 | 0.015723 | 0.015723 | 0.022013 | 0.006289 | 0.006289 | 0.009434 | 0 | 0.003145 | 0.003145 | 0.003145 | 0 | 0 | |
| **0.12-0.17** | 0 | 0.015723 | 0.040881 | 0.044025 | 0.031447 | 0.025157 | 0.015723 | 0.006289 | 0 | 0.003145 | 0.006289 | 0.012579 | 0.006289 | 0 | 0.009434 | 0 | |
| **0.17-0.23** | 0 | 0 | 0.015723 | 0.003145 | 0.012579 | 0.012579 | 0.012579 | 0.015723 | 0.003145 | 0.009434 | 0.009434 | 0 | 0.012579 | 0.009434 | 0 | 0 | |
| **0.23-0.25** | 0 | 0 | 0.006289 | 0.005241 | 0.002096 | 0.004193 | 0.003145 | 0.001048 | 0.001048 | 0.004193 | 0.003145 | 0 | 0.001048 | 0 | 0.002096 | 0.001048 | |
| **0.25-0.29** | 0 | 0 | 0.012579 | 0.010482 | 0.004193 | 0.008386 | 0.006289 | 0.002096 | 0.002096 | 0.008386 | 0.006289 | 0 | 0.002096 | 0 | 0.004193 | 0.002096 | |
| **0.29-0.35** | 0 | 0 | 0 | 0 | 0.009434 | 0 | 0 | 0.009434 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0.003145 | |
| **0.35-0.40** | 0 | 0 | 0 | 0 | 0.005241 | 0.005241 | 0.015723 | 0.005241 | 0.002621 | 0.002621 | 0.005241 | 0 | 0 | 0 | 0.005241 | 0.010482 | |
| **0.40-0.41** | 0 | 0 | 0 | 0 | 0.001048 | 0.001048 | 0.003145 | 0.001048 | 0.000524 | 0.000524 | 0.001048 | 0 | 0 | 0 | 0.001048 | 0.002096 | |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0 | 0.003145 | 0.003145 | 0 | 0 | 0.003145 | 0.003145 | |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.006289 | 0 | 0.003145 | 0.006289 | 0.009434 | 0.012579 | 0.006289 | 0.006289 | 0 | 0.012579 | 0.006289 | |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0.003145 | 0 | 0.012579 | 0.022013 | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | | Total | 1.00 | | |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | | 0.5 | length | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | | 0.774725 | length | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5** | **5-5.28** | **5.28-5.9** | **5.9-10** | **>10** | |
| **0-0.06** | 0.012956 | 0.094229 | 0.044759 | 0.022379 | 0.030624 | 0.008245 | 0.010601 | 0.005889 | 0 | 0.002356 | 0.001178 | 0 | 0.002356 | 0 | 0 | 0 | 0 | 0 | |
| **0.06-0.12** | 0.001178 | 0.056537 | 0.061249 | 0.030624 | 0.020024 | 0.017668 | 0.007067 | 0.005889 | 0.008245 | 0.001178 | 0.003534 | 0.001178 | 0.002356 | 0 | 0 | 0.002356 | 0.000265 | 0.0009125 | |
| **0.12-0.17** | 0 | 0.014134 | 0.023557 | 0.031802 | 0.027091 | 0.015312 | 0.009423 | 0.007067 | 0.007067 | 0.005889 | 0.005889 | 0.001178 | 0.004711 | 0 | 0 | 0.004711 | 0.000531 | 0.001825 | |
| **0.17-0.23** | 0 | 0 | 0.002356 | 0.010601 | 0.015312 | 0.010601 | 0.010601 | 0.008245 | 0.002356 | 0.004711 | 0.005889 | 0.003534 | 0.002356 | 0 | 0 | 0.004711 | 0.000796 | 0.0027375 | |
| **0.23-0.25** | 0 | 0 | 0.001963 | 0.001963 | 0.004319 | 0.005497 | 0.003534 | 0.003926 | 0.002356 | 0.002356 | 0.004319 | 0 | 0.001178 | 0.000196 | 0.000196 | 0.002356 | 0 | 0 | |
| **0.25-0.29** | 0 | 0 | 0.003926 | 0.003926 | 0.008638 | 0.010993 | 0.007067 | 0.007852 | 0.004711 | 0.004711 | 0.008638 | 0 | 0.002356 | 0.000393 | 0.000393 | 0.004711 | 0 | 0 | |
| **0.29-0.35** | 0 | 0 | 0 | 0 | 0.003534 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.002356 | 0.001178 | 0.001178 | 0.001178 | 0.003534 | 0.000265 | 0.0009125 | |
| **0.35-0.40** | 0 | 0 | 0.000982 | 0 | 0.002945 | 0.003926 | 0.000982 | 0.002945 | 0.002945 | 0.001963 | 0.002945 | 0.000982 | 0.001963 | 0.001472 | 0.001472 | 0 | 0.002211 | 0.0076043 | |
| **0.40-0.41** | 0 | 0 | 0.000196 | 0 | 0.000589 | 0.000785 | 0.000196 | 0.000589 | 0.000589 | 0.000393 | 0.000589 | 0.000196 | 0.000393 | 0.000294 | 0.000294 | 0 | 0.000442 | 0.0015209 | |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0.002356 | 0.003534 | 0 | 0.001178 | 0.005889 | 0.004711 | 0.002356 | 0 | 0.002356 | 0 | 0 | 0.005889 | 0.000531 | 0.001825 | |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.001178 | 0 | 0 | 0.001178 | 0 | 0 | 0.001178 | 0 | 0 | |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.002356 | 0 | 0.001178 | 0.004711 | 0.002356 | 0.004711 | 0.004711 | 0.005889 | 0.002945 | 0.002945 | 0.004711 | 0.001061 | 0.0036501 | |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.003534 | 0.002356 | 0.007067 | 0.002356 | 0 | 0 | 0.025913 | 0.002123 | 0.0073001 | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reference:** | **Dement and Harris 1979** | | | | | | | | | | | | | | | total | 1.00 | | |
| **Fiber Type:** | **Anthophyllite** | | | | | | | | | | | | | | | | | | |
| **Industry:** | **Talc Production** | | | | | | | | | | | | | | | | | | |
| **Operation:** | **Mining and Milling** | | | | | | | | | | | | | | | | | | |
| | **Length (um)** | | | | | | | | | | | | | | | | | | |
| **Diameter (um)** | **0-0.3** | **0.3-0.58** | **0.58-0.9** | **0.9-1.16** | **1.16-1.48** | **1.48-1.76** | **1.76-2.06** | **2.06-2.34** | **2.34-2.66** | **2.66-2.92** | **2.92-3.54** | **3.54-4.1** | **4.1-4.72** | **4.72-5** | **5-5.28** | **5.28-5.9** | **5.9-10** | **>10** | |
| **0-0.06** | 0.015723 | 0.034591 | 0.034591 | 0.015723 | 0.018868 | 0.003145 | 0.003145 | 0.006289 | 0 | 0.006289 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| **0.06-0.12** | 0 | 0.040881 | 0.044025 | 0.034591 | 0.015723 | 0.015723 | 0.022013 | 0.006289 | 0.006289 | 0.009434 | 0 | 0.003145 | 0.003145 | 0.001572 | 0.001572 | 0 | 0 | 0 | |
| **0.12-0.17** | 0 | 0.015723 | 0.040881 | 0.044025 | 0.031447 | 0.025157 | 0.015723 | 0.006289 | 0 | 0.003145 | 0.006289 | 0.012579 | 0.006289 | 0 | 0 | 0.009434 | 0 | 0 | |
| **0.17-0.23** | 0 | 0 | 0.015723 | 0.003145 | 0.012579 | 0.012579 | 0.012579 | 0.015723 | 0.003145 | 0.009434 | 0.009434 | 0 | 0.012579 | 0.004717 | 0.004717 | 0 | 0 | 0 | |
| **0.23-0.25** | 0 | 0 | 0.006289 | 0.005241 | 0.002096 | 0.004193 | 0.003145 | 0.001048 | 0.001048 | 0.004193 | 0.003145 | 0 | 0.001048 | 0 | 0 | 0.002096 | 0.000236 | 0.0008121 | |
| **0.25-0.29** | 0 | 0 | 0.012579 | 0.010482 | 0.004193 | 0.008386 | 0.006289 | 0.002096 | 0.002096 | 0.008386 | 0.006289 | 0 | 0.002096 | 0 | 0 | 0.004193 | 0.000472 | 0.0016242 | |
| **0.29-0.35** | 0 | 0 | 0 | 0 | 0.009434 | 0 | 0 | 0.009434 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0 | 0.000708 | 0.0024362 | |
| **0.35-0.40** | 0 | 0 | 0 | 0 | 0.005241 | 0.005241 | 0.015723 | 0.005241 | 0.002621 | 0.002621 | 0.005241 | 0 | 0 | 0 | 0 | 0.005241 | 0.002361 | 0.0081208 | |
| **0.40-0.41** | 0 | 0 | 0 | 0 | 0.001048 | 0.001048 | 0.003145 | 0.001048 | 0.000524 | 0.000524 | 0.001048 | 0 | 0 | 0 | 0 | 0.001048 | 0.000472 | 0.0016242 | |
| **0.41-0.47** | 0 | 0 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0 | 0.003145 | 0.003145 | 0 | 0 | 0 | 0.003145 | 0.000708 | 0.0024362 | |
| **0.47-0.53** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| **0.53-0.59** | 0 | 0 | 0 | 0 | 0 | 0.006289 | 0 | 0.003145 | 0.006289 | 0.009434 | 0.012579 | 0.006289 | 0.006289 | 0 | 0 | 0.012579 | 0.001417 | 0.0048725 | |
| **>0.6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0 | 0.003145 | 0 | 0 | 0.012579 | 0.004959 | 0.0170537 | |

## BINS OF INTEREST BY OPERATION

| | | |
|---|---|---|
| **Reference:** | **Dement and Harris 1979** | *Index 25* |
| **Fiber Type:** | **Anthophyllite** | |
| **Industry:** | **Talc Production** | |
| **Operation:** | **Mining and Milling** | |

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.7136 | 0.0159 | 0.0055 | 0.0817 |
| 0.25<w<0.4 | 0.1096 | 0.0138 | 0.0085 | |
| w < 0.4 | 0.8232 | 0.0297 | 0.0140 | |
| w > 0.4 | 0.0737 | 0.0451 | 0.0143 | |

| | | |
|---|---|---|
| **Reference:** | **Dement and Harris 1979** | *Index 26* |
| **Fiber Type:** | **Anthophyllite** | |
| **Industry:** | **Talc Production** | |
| **Operation:** | **Mining and Milling** | |

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.6918 | 0.0181 | 0.0008 | 0.0881 |
| 0.25<w<0.4 | 0.1268 | 0.0130 | 0.0122 | |
| w < 0.4 | 0.8187 | 0.0310 | 0.0130 | |
| w > 0.4 | 0.0744 | 0.0369 | 0.0260 | |

## BINS OF INTEREST ACROSS OPERATIONS

| | | |
|---|---|---|
| **Reference:** | **Dement and Harris 1979** | *Index 25, 26* |
| **Fiber Type:** | **Anthophyllite** | |
| **Industry:** | **Talc Production** | |
| **Operation:** | **Combined** | |

| | L<5 | L5-10 | L>10 | PCME |
|---|---|---|---|---|
| w <0.25 | 0.7027 | 0.0170 | 0.0031 | 0.0849 |
| 0.25<w<0.4 | 0.1182 | 0.0134 | 0.0103 | |
| w < 0.4 | 0.8209 | 0.0304 | 0.0135 | |
| w > 0.4 | 0.0741 | 0.0410 | 0.0201 | |

**RAW DATA AS PRESENTED IN GIBBS AND HWANG 1980 TABLE 2**

**Fiber Type: Crocidolite**
**Industry: Mining/Milling**
**Operation: Mining**

| Width (um) \ Length (um) | ≤ 2.5 | 2.51-5.00 | 5.01-7.50 | 7.51-10.00 | 10.01-20.00 | Total | CDF |
|---|---|---|---|---|---|---|---|
| ≤ 0.06 | 34.09 | 2.16 | 0.25 | 0.04 | 0.07 | 36.61 | 36.61 |
| 0.061-0.100 | 27.01 | 2.7 | 0.65 | 0.07 | 0.07 | 30.5 | 67.11 |
| 0.101-0.200 | 19.96 | 3.99 | 0.86 | 0.43 | 0.54 | 25.78 | 92.89 |
| 0.201-0.300 | 3.31 | 1.04 | 0.43 | 0.11 | 0.04 | 4.93 | 97.82 |
| >0.300 | 0.9 | 0.81 | 0.3 | | 0.11 | 2.12 | 99.94 |
| | | | | Total | 99.94 | | |

| x | p-tile | ln(x) | z |
|---|---|---|---|
| 0.06 | 0.3661 | -2.8134107 | -0.3422005 |
| 0.10 | 0.6711 | -2.3025851 | 0.44295263 |
| 0.20 | 0.9289 | -1.6094379 | 1.46764749 |
| 0.30 | 0.9782 | -1.2039728 | 2.0179161 |

| | |
|---|---|
| slope = sigma | 0.680 |
| intercept = mu | -2.592 |
| percentile for 0.4 | 0.9931 |
| percentile for 0.3 | 0.9794 |
| fraction of >0.3 that is > 0.4 | 0.33 |

**Fiber Type: Crocidolite**
**Industry: Mining/Milling**
**Operation: Bagging**

| Width (um) \ Length (um) | ≤ 2.5 | 2.51-5.00 | 5.01-7.50 | 7.51-10.00 | 10.01-20.00 | Total | CDF |
|---|---|---|---|---|---|---|---|
| ≤ 0.06 | 26.9 | 1.88 | 0.22 | 0.11 | 0 | 29.11 | 29.11 |
| 0.061-0.100 | 24.74 | 3.92 | 0.61 | 0.39 | 0.17 | 29.83 | 58.94 |
| 0.101-0.200 | 22.81 | 6.29 | 2.48 | 0.77 | 0.5 | 32.85 | 91.79 |
| 0.201-0.300 | 2.6 | 1.82 | 0.83 | 0.22 | 0.22 | 5.69 | 97.48 |
| >0.300 | 0.72 | 1.27 | 0.34 | 0.23 | 0 | 2.56 | 100.04 |
| | | | | Total | 100.04 | | |

| x | p-tile | ln(x) | z |
|---|---|---|---|
| 0.06 | 0.2911 | -2.8134107 | -0.5501741 |
| 0.10 | 0.5894 | -2.3025851 | 0.22600183 |
| 0.20 | 0.9179 | -1.6094379 | 1.39108386 |
| 0.30 | 0.9748 | -1.2039728 | 1.95655339 |

| | |
|---|---|
| slope = sigma | 0.633 |
| intercept = mu | -2.461 |
| percentile for 0.4 | 0.9926 |
| percentile for 0.3 | 0.9764 |
| fraction of >0.3 that is > 0.4 | 0.31 |

**Fiber Type: Chrysotile**
**Industry: Mining/Milling**
**Operation: Mining**

| Width (um) \ Length (um) | ≤ 2.5 | 2.51-5.00 | 5.01-7.50 | 7.51-10.00 | 10.01-20.00 | Total | CDF |
|---|---|---|---|---|---|---|---|
| ≤ 0.06 | 60.73 | 0.57 | 0 | 0 | 0 | 61.3 | 61.3 |
| 0.061-0.100 | 23.79 | 0.66 | 0.13 | 0.04 | 0 | 24.62 | 85.92 |
| 0.101-0.200 | 8.59 | 0.66 | 0.13 | 0 | 0.04 | 9.42 | 95.34 |
| 0.201-0.300 | 1.23 | 0.31 | 0.13 | 0 | 0 | 1.67 | 97.01 |
| >0.300 | 0.97 | 1.19 | 0.51 | 0.12 | 0.13 | 2.92 | 99.93 |
| | | | | Total | 99.93 | | |

| x | p-tile | ln(x) | z |
|---|---|---|---|
| 0.06 | 0.613 | -2.8134107 | 0.28714669 |
| 0.10 | 0.8592 | -2.3025851 | 1.07673203 |
| 0.20 | 0.9534 | -1.6094379 | 1.67875398 |
| 0.30 | 0.9701 | -1.2039728 | 1.88226533 |

| | |
|---|---|
| slope = sigma | 0.979 |
| intercept = mu | -3.188 |
| percentile for 0.4 | 0.9898 |
| percentile for 0.3 | 0.9786 |
| fraction of >0.3 that is > 0.4 | 0.48 |

**Fiber Type: Chrysotile**
**Industry: Mining/Milling**
**Operation: Bagging**

| Width (um) \ Length (um) | ≤ 2.5 | 2.51-5.00 | 5.01-7.50 | 7.51-10.00 | 10.01-20.00 | Total | CDF |
|---|---|---|---|---|---|---|---|
| ≤ 0.06 | 51.65 | 0.62 | 0.16 | 0.10 | 0.03 | 52.56 | 52.56 |
| 0.061-0.100 | 23.99 | 1.41 | 0.39 | 0.10 | 0.03 | 25.92 | 78.48 |
| 0.101-0.200 | 12.38 | 2.04 | 0.66 | 0.20 | 0.36 | 15.64 | 94.12 |
| 0.201-0.300 | 1.38 | 0.79 | 0.16 | 0.06 | 0.16 | 2.55 | 96.67 |
| >0.300 | 0.74 | 0.88 | 0.88 | 0.32 | 0.33 | 3.15 | 99.82 |
| | | | | Total | 99.82 | | |

| x | p-tile | ln(x) | z |
|---|---|---|---|
| 0.06 | 0.5256 | -2.8134107 | 0.06421379 |
| 0.10 | 0.7848 | -2.3025851 | 0.78850735 |
| 0.20 | 0.9412 | -1.6094379 | 1.56492712 |
| 0.30 | 0.9667 | -1.2039728 | 1.83436386 |

| | |
|---|---|
| slope = sigma | 0.888 |
| intercept = mu | -2.927 |
| percentile for 0.4 | 0.9882 |
| percentile for 0.3 | 0.9738 |
| fraction of >0.3 that is > 0.4 | 0.45 |

**Fiber Type: Amosite**
**Industry: Mining/Milling**
**Operation: Mining**

| Width (um) \ Length (um) | ≤ 2.5 | 2.51-5.00 | 5.01-7.50 | 7.51-10.00 | 10.01-20.00 | Total | CDF |
|---|---|---|---|---|---|---|---|
| ≤ 0.06 | 14.84 | 0.25 | 0 | 0 | 0 | 15.09 | 15.09 |
| 0.061-0.100 | 8.98 | 0.62 | 0.12 | 0 | 0 | 9.72 | 24.81 |
| 0.101-0.200 | 19.45 | 4.99 | 1.62 | 0.37 | 0.12 | 26.55 | 51.36 |
| 0.201-0.300 | 11.47 | 5.74 | 1.75 | 0.87 | 0.62 | 20.45 | 71.81 |
| >0.300 | 9.09 | 12.2 | 3.86 | 1.86 | 0.99 | 28 | 99.81 |
| | | | | Total | 99.81 | | |

| x | p-tile | ln(x) | z |
|---|---|---|---|
| 0.06 | 0.1509 | -2.8134107 | -1.0325811 |
| 0.10 | 0.2481 | -2.3025851 | -0.6804809 |
| 0.20 | 0.5136 | -1.6094379 | 0.03409675 |
| 0.30 | 0.7181 | -1.2039728 | 0.57720645 |

| | |
|---|---|
| slope = sigma | 0.699 |
| intercept = mu | -1.723 |
| percentile for 0.4 | 0.9931 |
| percentile for 0.3 | 0.9794 |
| fraction of >0.3 that is > 0.4 | 0.33 |

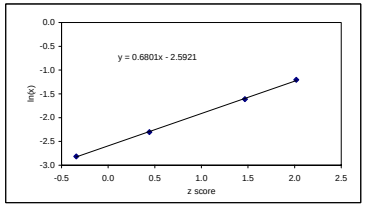
**Fiber Type: Amosite**
**Industry: Mining/Milling**
**Operation: Bagging**

| Width (um) \ Length (um) | ≤ 2.5 | 2.51-5.00 | 5.01-7.50 | 7.51-10.00 | 10.01-20.00 | Total | CDF |
|---|---|---|---|---|---|---|---|
| ≤ 0.06 | 2.59 | 0 | 0 | 0 | 0 | 2.59 | 2.59 |
| 0.061-0.100 | 5.97 | 0.75 | 0.12 | 0.08 | 0 | 6.92 | 9.51 |
| 0.101-0.200 | 17.21 | 4.63 | 1.8 | 0.9 | 0.71 | 25.25 | 34.76 |
| 0.201-0.300 | 12.55 | 5.79 | 2.03 | 1.01 | 0.86 | 22.24 | 57 |
| >0.300 | 11.31 | 14.68 | 6.75 | 4.33 | 4.77 | 41.84 | 98.84 |
| | | | | Total | 98.84 | | |

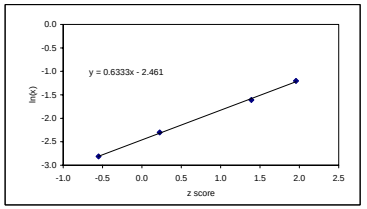
| x | p-tile | ln(x) | z |
|---|---|---|---|
| 0.06 | 0.0259 | -2.8134107 | -1.9447921 |
| 0.10 | 0.0951 | -2.3025851 | -1.3099877 |
| 0.20 | 0.3476 | -1.6094379 | -0.3918081 |
| 0.30 | 0.57 | -1.2039728 | 0.17637416 |

| | |
|---|---|
| slope = sigma | 0.758 |
| intercept = mu | -1.324 |
| percentile for 0.4 | 0.9931 |
| percentile for 0.3 | 0.9794 |
| fraction of >0.3 that is > 0.4 | 0.33 |

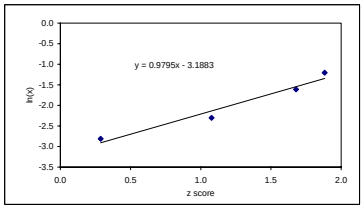
**Fiber Type: Crocidolite**
**Operation: Mining**



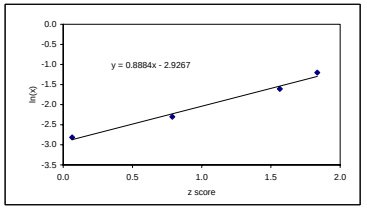

**Fiber Type: Crocidolite**
**Operation: Bagging**



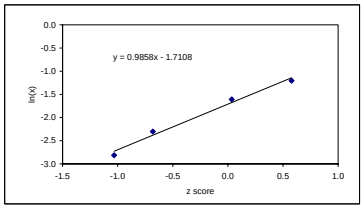

**Fiber Type: Chrysotile**
**Operation: Mining**



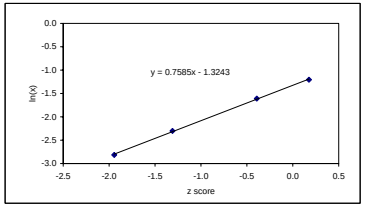

**Fiber Type: Chrysotile**
**Operation: Bagging**




**Fiber Type: Amosite**
**Operation: Mining**




**Fiber Type: Amosite**
**Operation: Bagging**



**DATA PRESENTED IN GIBBS AND HWANG 1980 TABLE 1**

| Length (um) | Crocidolite | | Amosite | | Chrysotile | |
|---|---|---|---|---|---|---|
| | **Mining** | **Bagging** | **Mining** | **Bagging** | **Mining** | **Bagging** |
| < 1 | 52.430 | 43.340 | 31.800 | 18.520 | 85.950 | 70.620 |
| 1-2 | 26.050 | 27.880 | 21.940 | 21.970 | 7.890 | 16.410 |
| 2-3 | 10.330 | 11.540 | 17.210 | 15.890 | 2.690 | 5.420 |
| 3-4 | 4.710 | 6.730 | 10.100 | 11.760 | 1.500 | 2.040 |
| 4-5 | 2.450 | 3.430 | 6.610 | 7.320 | 0.700 | 1.410 |
| 5-7.5 | 2.490 | 4.460 | 7.357 | 10.706 | 0.926 | 2.265 |
| 7.5-10 | 0.670 | 1.710 | 3.117 | 6.311 | 0.176 | 0.787 |
| 10-20 | 0.830 | 0.880 | 1.746 | 6.349 | 0.176 | 0.919 |
| 20-30 | 0.070 | 0.004 | 0.180 | 0.714 | 0.006 | 0.131 |
| 30-40 | 0.005 | 0.008 | 0.108 | 0.376 | 0.002 | 0.042 |
| 40-50 | 0.005 | 0.008 | 0.036 | 0.038 | 0.002 | 0.013 |
| 50-100 | 0.038 | 0.033 | 0.048 | 0.087 | 0.001 | 0.024 |
| >100 | 0.010 | 0.008 | 0.072 | 0.044 | 0.001 | 0.015 |
| | | | | | | |
| 0 - 20 | 99.960 | 99.970 | 99.880 | 98.826 | 100.008 | 99.871 |
| > 20 | 0.128 | 0.061 | 0.444 | 1.259 | 0.012 | 0.225 |
| Total | 100.088 | 100.031 | 100.324 | 100.085 | 100.020 | 100.096 |
| | | | | | | |
| **Adj factor** | 0.99872 | 0.99939 | 0.99557 | 0.98742 | 0.99988 | 0.99775 |

**GIBBS AND HWANG 1980 TABLE 2**

**UNADJUSTED**

**Fiber Type: Crocidolite**
**Operation: Mining**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 34.090 | 2.160 | 0.250 | 0.040 | 0.070 |
| 0.06 | 0.1 | 27.010 | 2.700 | 0.650 | 0.070 | 0.070 |
| 0.1 | 0.2 | 19.960 | 3.990 | 0.860 | 0.430 | 0.540 |
| 0.2 | 0.3 | 3.310 | 1.040 | 0.430 | 0.110 | 0.040 |
| >0.3 | | 0.900 | 0.810 | 0.300 | 0.000 | 0.110 |
| | | | | | | 99.940 |

**Fiber Type: Crocidolite**
**Operation: Bagging**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 26.9 | 1.88 | 0.22 | 0.11 | 0 |
| 0.06 | 0.1 | 24.74 | 3.92 | 0.61 | 0.39 | 0.17 |
| 0.1 | 0.2 | 22.81 | 6.29 | 2.48 | 0.77 | 0.5 |
| 0.2 | 0.3 | 2.6 | 1.82 | 0.83 | 0.22 | 0.22 |
| >0.3 | | 0.72 | 1.27 | 0.34 | 0.23 | 0 |
| | | | | | | 100.040 |

**NORMALIZED TO 100**

**Fiber Type: Crocidolite**
**Operation: Mining**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 0.341 | 0.022 | 0.003 | 0.000 | 0.001 |
| 0.06 | 0.1 | 0.270 | 0.027 | 0.007 | 0.001 | 0.001 |
| 0.1 | 0.2 | 0.200 | 0.040 | 0.009 | 0.004 | 0.005 |
| 0.2 | 0.3 | 0.033 | 0.010 | 0.004 | 0.001 | 0.000 |
| >0.3 | | 0.009 | 0.008 | 0.003 | 0.000 | 0.001 |
| | | | | | | 1.000 |

**Fiber Type: Crocidolite**
**Operation: Bagging**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 0.269 | 0.019 | 0.002 | 0.001 | 0.000 |
| 0.06 | 0.1 | 0.247 | 0.039 | 0.006 | 0.004 | 0.002 |
| 0.1 | 0.2 | 0.228 | 0.063 | 0.025 | 0.008 | 0.005 |
| 0.2 | 0.3 | 0.026 | 0.018 | 0.008 | 0.002 | 0.002 |
| >0.3 | | 0.007 | 0.013 | 0.003 | 0.002 | 0.000 |
| | | | | | | 1.000 |

**ADJUSTED FOR LENGTH**

**Fiber Type: Crocidolite; Operation: Mining**

| | | Adj Fact | 0.99872 | 0.00127887 | | 0.008 | |
|---|---|---|---|---|---|---|---|
| | | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.3407 | 0.0216 | 0.0025 | 0.0004 | 0.0007 | 0.0001 |
| 0.06 | 0.1 | 0.2699 | 0.0270 | 0.0065 | 0.0007 | 0.0007 | 0.0001 |
| 0.1 | 0.2 | 0.1995 | 0.0399 | 0.0086 | 0.0043 | 0.0054 | 0.0008 |
| 0.2 | 0.3 | 0.0331 | 0.0104 | 0.0043 | 0.0011 | 0.0004 | 0.0001 |
| >0.3 | | 0.0090 | 0.0081 | 0.0030 | 0.0000 | 0.0011 | 0.0002 |
| | | | | | | 0.9987 | 1.0000 |

**Fiber Type: Crocidolite; Operation: Bagging**

| | | Adj Fact | 0.99939 | 0.00060981 | | 0.009 | |
|---|---|---|---|---|---|---|---|
| | | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.269 | 0.019 | 0.002 | 0.001 | 0.000 | 0 |
| 0.06 | 0.1 | 0.247 | 0.039 | 0.006 | 0.004 | 0.002 | 0.00011648 |
| 0.1 | 0.2 | 0.228 | 0.063 | 0.025 | 0.008 | 0.005 | 0.00034259 |
| 0.2 | 0.3 | 0.026 | 0.018 | 0.008 | 0.002 | 0.002 | 0.00015074 |
| >0.3 | | 0.007 | 0.013 | 0.003 | 0.002 | 0.000 | 0 |
| | | | | | | 0.9994 | 1.0000 |

**Fiber Type: Chrysotile**
**Operation: Mining**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 60.73 | 0.57 | 0 | 0 | 0 |
| 0.06 | 0.1 | 23.79 | 0.66 | 0.13 | 0.04 | 0 |
| 0.1 | 0.2 | 8.59 | 0.66 | 0.13 | 0 | 0.04 |
| 0.2 | 0.3 | 1.23 | 0.31 | 0.13 | 0 | 0 |
| >0.3 | | 0.97 | 1.19 | 0.51 | 0.12 | 0.13 |
| | | | | | | 99.930 |

**Fiber Type: Chrysotile**
**Operation: Mining**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 0.608 | 0.006 | 0.000 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.238 | 0.007 | 0.001 | 0.000 | 0.000 |
| 0.1 | 0.2 | 0.086 | 0.007 | 0.001 | 0.000 | 0.000 |
| 0.2 | 0.3 | 0.012 | 0.003 | 0.001 | 0.000 | 0.000 |
| >0.3 | | 0.010 | 0.012 | 0.005 | 0.001 | 0.001 |
| | | | | | | 1.000 |

**Fiber Type: Chrysotile; Operation: Mining**

| | | Adj Fact | 0.99988 | 0.00011998 | | 0.002 | |
|---|---|---|---|---|---|---|---|
| | | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.608 | 0.006 | 0.000 | 0.000 | 0.000 | 0 |
| 0.06 | 0.1 | 0.238 | 0.007 | 0.001 | 0.000 | 0.000 | 0 |
| 0.1 | 0.2 | 0.086 | 0.007 | 0.001 | 0.000 | 0.000 | 2.823E-05 |
| 0.2 | 0.3 | 0.012 | 0.003 | 0.001 | 0.000 | 0.000 | 0 |
| >0.3 | | 0.010 | 0.012 | 0.005 | 0.001 | 0.001 | 9.1746E-05 |
| | | | | | | 0.9999 | 1.0000 |

**Fiber Type: Chrysotile**
**Operation: Bagging**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 51.65 | 0.62 | 0.16 | 0.1 | 0.03 |
| 0.06 | 0.1 | 23.99 | 1.41 | 0.39 | 0.1 | 0.03 |
| 0.1 | 0.2 | 12.38 | 2.04 | 0.66 | 0.2 | 0.36 |
| 0.2 | 0.3 | 1.38 | 0.79 | 0.16 | 0.06 | 0.16 |
| >0.3 | | 0.74 | 0.88 | 0.88 | 0.32 | 0.33 |
| | | | | | | 99.820 |

**Fiber Type: Chrysotile**
**Operation: Bagging**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 0.517 | 0.006 | 0.002 | 0.001 | 0.000 |
| 0.06 | 0.1 | 0.240 | 0.014 | 0.004 | 0.001 | 0.000 |
| 0.1 | 0.2 | 0.124 | 0.020 | 0.007 | 0.002 | 0.004 |
| 0.2 | 0.3 | 0.014 | 0.008 | 0.002 | 0.001 | 0.002 |
| >0.3 | | 0.007 | 0.009 | 0.009 | 0.003 | 0.003 |
| | | | | | | 1.000 |

**Fiber Type: Chrysotile; Operation: Bagging**

| | | Adj Fact | 0.99775 | 0.00224784 | | 0.009 | |
|---|---|---|---|---|---|---|---|
| | | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.516 | 0.006 | 0.002 | 0.001 | 0.000 | 7.4105E-05 |
| 0.06 | 0.1 | 0.240 | 0.014 | 0.004 | 0.001 | 0.000 | 7.4105E-05 |
| 0.1 | 0.2 | 0.124 | 0.020 | 0.007 | 0.002 | 0.004 | 0.00088926 |
| 0.2 | 0.3 | 0.014 | 0.008 | 0.002 | 0.001 | 0.002 | 0.00039522 |
| >0.3 | | 0.007 | 0.009 | 0.009 | 0.003 | 0.003 | 0.00081515 |
| | | | | | | 0.9978 | 1.0000 |

**Fiber Type: Amosite**
**Operation: Mining**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 14.84 | 0.25 | 0 | 0 | 0 |
| 0.06 | 0.1 | 8.98 | 0.62 | 0.12 | 0 | 0 |
| 0.1 | 0.2 | 19.45 | 4.99 | 1.62 | 0.37 | 0.12 |
| 0.2 | 0.3 | 11.47 | 5.74 | 1.75 | 0.87 | 0.62 |
| >0.3 | | 9.09 | 12.2 | 3.86 | 1.86 | 0.99 |
| | | | | | | 99.810 |

**Fiber Type: Amosite**
**Operation: Mining**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 0.149 | 0.003 | 0.000 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.090 | 0.006 | 0.001 | 0.000 | 0.000 |
| 0.1 | 0.2 | 0.195 | 0.050 | 0.016 | 0.004 | 0.001 |
| 0.2 | 0.3 | 0.115 | 0.058 | 0.018 | 0.009 | 0.006 |
| >0.3 | | 0.091 | 0.122 | 0.039 | 0.019 | 0.010 |
| | | | | | | 1.000 |

**Fiber Type: Amosite; Operation: Mining**

| | | Adj Fact | 0.99557 | 0.00442566 | | 0.017 | |
|---|---|---|---|---|---|---|---|
| | | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.148 | 0.002 | 0.000 | 0.000 | 0.000 | 0 |
| 0.06 | 0.1 | 0.090 | 0.006 | 0.001 | 0.000 | 0.000 | 0 |
| 0.1 | 0.2 | 0.194 | 0.050 | 0.016 | 0.004 | 0.001 | 0.00030698 |
| 0.2 | 0.3 | 0.114 | 0.057 | 0.017 | 0.009 | 0.006 | 0.00158607 |
| >0.3 | | 0.091 | 0.122 | 0.039 | 0.019 | 0.010 | 0.0025326 |
| | | | | | | 0.9956 | 1.0000 |

**Fiber Type: Amosite**
**Operation: Bagging**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 2.59 | 0 | 0 | 0 | 0 |
| 0.06 | 0.1 | 5.97 | 0.75 | 0.12 | 0.08 | 0 |
| 0.1 | 0.2 | 17.21 | 4.63 | 1.8 | 0.9 | 0.71 |
| 0.2 | 0.3 | 12.55 | 5.79 | 2.03 | 1.01 | 0.86 |
| >0.3 | | 11.31 | 14.68 | 6.75 | 4.33 | 4.77 |
| | | | | | | 98.840 |

**Fiber Type: Amosite**
**Operation: Bagging**

| | | 0 | 2.5 | 5 | 7.5 | 10 |
|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 |
| 0 | 0.06 | 0.026 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.060 | 0.008 | 0.001 | 0.001 | 0.000 |
| 0.1 | 0.2 | 0.174 | 0.047 | 0.018 | 0.009 | 0.007 |
| 0.2 | 0.3 | 0.127 | 0.059 | 0.021 | 0.010 | 0.009 |
| >0.3 | | 0.114 | 0.149 | 0.068 | 0.044 | 0.048 |
| | | | | | | 1.000 |

**Fiber Type: Amosite; Operation: Bagging**

| | | Adj Fact | 0.98742 | 0.01257931 | | 0.063 | |
|---|---|---|---|---|---|---|---|
| | | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.026 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| 0.06 | 0.1 | 0.060 | 0.007 | 0.001 | 0.001 | 0.000 | 0 |
| 0.1 | 0.2 | 0.172 | 0.046 | 0.018 | 0.009 | 0.007 | 0.00140872 |
| 0.2 | 0.3 | 0.125 | 0.058 | 0.020 | 0.010 | 0.009 | 0.00170634 |
| >0.3 | | 0.113 | 0.147 | 0.067 | 0.043 | 0.048 | 0.00946424 |
| | | | | | | 0.9874 | 1.0000 |

**BINS OF INTEREST BY OPERATION**

**BINS OF INTEREST ACROSS OPERATIONS**

## WIDTH EXTRAPOLATION

**Fiber Type: Crocidolite**
**Operation: Mining**

| **Fraction** | 0.33 | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
|---|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.3407 | 0.0216 | 0.0025 | 0.0004 | 0.0007 | 0.0001 |
| 0.06 | 0.1 | 0.2699 | 0.0270 | 0.0065 | 0.0007 | 0.0007 | 0.0001 |
| 0.1 | 0.2 | 0.1995 | 0.0399 | 0.0086 | 0.0043 | 0.0054 | 0.0008 |
| 0.2 | 0.3 | 0.0331 | 0.0104 | 0.0043 | 0.0011 | 0.0004 | 0.0001 |
| 0.3 | 0.4 | 0.0060 | 0.0054 | 0.0020 | 0.0000 | 0.0007 | 0.0001 |
| > 0.4 | | 0.0030 | 0.0027 | 0.0010 | 0.0000 | 0.0004 | 0.0001 |

1

Note: Compare with Hwang and Gibbs 1981 Table 5

**Fiber Type: Crocidolite**
**Operation: Bagging**

| **Fraction** | 0.31 | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
|---|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.269 | 0.019 | 0.002 | 0.001 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.247 | 0.039 | 0.006 | 0.004 | 0.002 | 0.000 |
| 0.1 | 0.2 | 0.228 | 0.063 | 0.025 | 0.008 | 0.005 | 0.000 |
| 0.2 | 0.3 | 0.026 | 0.018 | 0.008 | 0.002 | 0.002 | 0.000 |
| 0.3 | 0.4 | 0.0049 | 0.0087 | 0.0023 | 0.0016 | 0.0000 | 0.0000 |
| > 0.4 | | 0.0022 | 0.0040 | 0.0011 | 0.0007 | 0.0000 | 0.0000 |

1

Note: Compare with Hwang and Gibbs 1981 Table 5

**Fiber Type: Crocidolite** *Index 3*
**Operation: Mining**

| | Length | | | |
|---|---|---|---|---|
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.9202 | 0.0257 | 0.0081 | 0.00719555 |
| 0.25-0.4 | 0.0331 | 0.0047 | 0.0011 | |
| <0.4 | 0.9534 | 0.0304 | 0.0092 | |
| > 0.4 | 0.0057 | 0.0010 | 0.0004 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Crocidolite** *Index 4*
**Operation: Bagging**

| | Length | | | |
|---|---|---|---|---|
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.8866 | 0.0510 | 0.0083 | 0.01211321 |
| 0.25-0.4 | 0.0358 | 0.0092 | 0.0012 | |
| <0.4 | 0.9224 | 0.0602 | 0.0095 | |
| > 0.4 | 0.0062 | 0.0018 | 0.0000 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Crocidolite** *Index 3, 4*
**Operation: Combined Mining & Bagging**

| | Length | | | |
|---|---|---|---|---|
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.9034 | 0.0383 | 0.0082 | 0.00965 |
| 0.25-0.4 | 0.0344 | 0.0069 | 0.0011 | |
| < 0.4 | 0.9379 | 0.0453 | 0.0093 | |
| > 0.4 | 0.0059 | 0.0014 | 0.0002 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Chrysotile**
**Operation: Mining**

| Fraction | 0.48 | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
|---|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.608 | 0.006 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.238 | 0.007 | 0.001 | 0.000 | 0.000 | 0.000 |
| 0.1 | 0.2 | 0.086 | 0.007 | 0.001 | 0.000 | 0.000 | 0.000 |
| 0.2 | 0.3 | 0.012 | 0.003 | 0.001 | 0.000 | 0.000 | 0.000 |
| 0.3 | 0.4 | 0.0051 | 0.0062 | 0.0027 | 0.0006 | 0.0007 | 0.0000 |
| > 0.4 | | 0.0046 | 0.0057 | 0.0024 | 0.0006 | 0.0006 | 0.0000 |

1

**Fiber Type: Chrysotile** *Index 5*
**Operation: Mining**

| Width | Length 0-5 | 5-10 | >10 | PCME |
|---|---|---|---|---|
| < 0.25 | 0.9583 | 0.0037 | 0.0004 | 0.00834653 |
| 0.25-0.4 | 0.0190 | 0.0040 | 0.0007 | |
| <0.4 | 0.9773 | 0.0076 | 0.0012 | |
| > 0.4 | 0.0103 | 0.0030 | 0.0007 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Chrysotile** *Index 5, 6*
**Operation: Combined Mining & Bagging**

| Width | Length 0-5 | 5-10 | >10 | PCME |
|---|---|---|---|---|
| < 0.25 | 0.9448 | 0.0104 | 0.0033 | 0.01328 |
| 0.25-0.4 | 0.0194 | 0.0058 | 0.0020 | |
| < 0.4 | 0.9642 | 0.0162 | 0.0053 | |
| > 0.4 | 0.0088 | 0.0042 | 0.0013 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Chrysotile**
**Operation: Bagging**

| Fraction | 0.45 | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
|---|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.516 | 0.006 | 0.002 | 0.001 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.240 | 0.014 | 0.004 | 0.001 | 0.000 | 0.000 |
| 0.1 | 0.2 | 0.124 | 0.020 | 0.007 | 0.002 | 0.004 | 0.001 |
| 0.2 | 0.3 | 0.014 | 0.008 | 0.002 | 0.001 | 0.002 | 0.000 |
| 0.3 | 0.4 | 0.0041 | 0.0048 | 0.0048 | 0.0018 | 0.0018 | 0.0004 |
| > 0.4 | | 0.0033 | 0.0040 | 0.0040 | 0.0014 | 0.0015 | 0.0004 |

1

**Fiber Type: Chrysotile** *Index 6*
**Operation: Bagging**

| Width | Length 0-5 | 5-10 | >10 | PCME |
|---|---|---|---|---|
| < 0.25 | 0.9313 | 0.0172 | 0.0062 | 0.01820505 |
| 0.25-0.4 | 0.0197 | 0.0077 | 0.0033 | |
| <0.4 | 0.9511 | 0.0249 | 0.0095 | |
| > 0.4 | 0.0073 | 0.0054 | 0.0019 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Amosite**
**Operation: Mining**

| Fraction | 0.33 | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
|---|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.148 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.090 | 0.006 | 0.001 | 0.000 | 0.000 | 0.000 |
| 0.1 | 0.2 | 0.194 | 0.050 | 0.016 | 0.004 | 0.001 | 0.000 |
| 0.2 | 0.3 | 0.114 | 0.057 | 0.017 | 0.009 | 0.006 | 0.002 |
| 0.3 | 0.4 | 0.0605 | 0.0812 | 0.0257 | 0.0124 | 0.0066 | 0.0017 |
| > 0.4 | | 0.0302 | 0.0405 | 0.0128 | 0.0062 | 0.0033 | 0.0008 |

1

**Fiber Type: Amosite** *Index 1*
**Operation: Mining**

| Width | Length 0-5 | 5-10 | >10 | PCME |
|---|---|---|---|---|
| < 0.25 | 0.5759 | 0.0341 | 0.0054 | 0.08641485 |
| 0.25-0.4 | 0.2275 | 0.0511 | 0.0122 | |
| <0.4 | 0.8034 | 0.0852 | 0.0175 | |
| > 0.4 | 0.0707 | 0.0190 | 0.0041 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Amosite** *Index 1, 2*
**Operation: Combined Mining & Bagging**

| Width | Length 0-5 | 5-10 | >10 | PCME |
|---|---|---|---|---|
| < 0.25 | 0.4893 | 0.0391 | 0.0095 | 0.13728 |
| 0.25-0.4 | 0.2461 | 0.0701 | 0.0277 | |
| < 0.4 | 0.7355 | 0.1092 | 0.0372 | |
| > 0.4 | 0.0786 | 0.0279 | 0.0116 | |

NOTE: Factor for splitting width bins=0.5.

**Fiber Type: Amosite**
**Operation: Bagging**

| Fraction | 0.33 | 0 | 2.5 | 5 | 7.5 | 10 | > 20 |
|---|---|---|---|---|---|---|---|
| | | 2.5 | 5 | 7.5 | 10 | 20 | |
| 0 | 0.06 | 0.026 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.06 | 0.1 | 0.060 | 0.007 | 0.001 | 0.001 | 0.000 | 0.000 |
| 0.1 | 0.2 | 0.172 | 0.046 | 0.018 | 0.009 | 0.007 | 0.001 |
| 0.2 | 0.3 | 0.125 | 0.058 | 0.020 | 0.010 | 0.009 | 0.002 |
| 0.3 | 0.4 | 0.0754 | 0.0978 | 0.0450 | 0.0288 | 0.0318 | 0.0063 |
| > 0.4 | | 0.0376 | 0.0488 | 0.0225 | 0.0144 | 0.0159 | 0.0032 |

1

**Fiber Type: Amosite** *Index 2*
**Operation: Bagging**

| Width | Length 0-5 | 5-10 | >10 | PCME |
|---|---|---|---|---|
| < 0.25 | 0.4028 | 0.0442 | 0.0137 | 0.18814105 |
| 0.25-0.4 | 0.2648 | 0.0890 | 0.0432 | |
| <0.4 | 0.6676 | 0.1332 | 0.0569 | |
| > 0.4 | 0.0865 | 0.0369 | 0.0190 | |

NOTE: Factor for splitting width bins=0.5.

**RAW DATA AS PRESENTED IN HWANG AND GIBBS 1981**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 (Table 5)** | | | | Total | 100.00 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Mining and Milling** | | | | | |
| **Operation:** | **Mining** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.060** | 34.09 | 2.16 | 0.25 | 0.04 | 0.07 | 0 |
| **0.061-0.100** | 27.01 | 2.7 | 0.65 | 0.07 | 0.07 | 0 |
| **0.101-0.200** | 19.94 | 3.99 | 0.86 | 0.43 | 0.54 | 0.04 |
| **0.201-0.300** | 3.31 | 1.04 | 0.43 | 0.11 | 0.04 | 0.04 |
| **0.301-0.400** | 0.65 | 0.4 | 0.14 | 0 | 0 | 0 |
| **0.401-0.500** | 0.25 | 0.22 | 0.04 | 0 | 0.04 | 0 |
| **>0.500** | 0 | 0.19 | 0.12 | 0 | 0.07 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 (Table 5)** | | | | Total | 100.04 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Mining and Milling** | | | | | |
| **Operation:** | **Bagging** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.060** | 26.9 | 1.88 | 0.22 | 0.11 | 0 | 0 |
| **0.061-0.100** | 24.74 | 3.92 | 0.61 | 0.39 | 0.17 | 0 |
| **0.101-0.200** | 22.81 | 6.29 | 2.48 | 0.77 | 0.5 | 0 |
| **0.201-0.300** | 2.6 | 1.82 | 0.83 | 0.22 | 0.22 | 0 |
| **0.301-0.400** | 0.5 | 0.83 | 0.17 | 0.11 | 0 | 0 |
| **0.401-0.500** | 0.22 | 0.22 | 0.06 | 0.06 | 0 | 0 |
| **>0.500** | 0 | 0.22 | 0.11 | 0.06 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 (Table 5)** | | | | Total | 99.94 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Cement Manufacturing** | | | | | |
| **Operation:** | **Dumping (Preparation)** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.060** | 26.79 | 1.24 | 0 | 0 | 0.04 | 0.04 |
| **0.061-0.100** | 33.17 | 2.44 | 0.39 | 0 | 0.04 | 0 |
| **0.101-0.200** | 23.42 | 3.56 | 0.58 | 0.12 | 0 | 0 |
| **0.201-0.300** | 3.64 | 1.86 | 0.23 | 0.12 | 0.04 | 0 |
| **0.301-0.400** | 0.81 | 0.62 | 0.08 | 0.12 | 0.04 | 0 |
| **0.401-0.500** | 0.04 | 0.27 | 0 | 0 | 0 | 0 |
| **>0.500** | 0.04 | 0.2 | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 Table 3(a)** | | | | Total | 99.98 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Mining and Milling** | | | | | |
| **Operation:** | **Mining, storage, crushing, bagging** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.10** | 55.66 | 4.87 | 0.76 | 0.17 | 0.11 | 0 |
| **0.11-0.20** | 22.21 | 5.13 | 1.43 | 0.48 | 0.36 | 0.01 |
| **0.21-0.40** | 4.25 | 2.2 | 0.78 | 0.21 | 0.11 | 0.01 |
| **>0.40** | 0.28 | 0.58 | 0.19 | 0.09 | 0.09 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 Table 3(a)** | | | | Total | 100 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Cement Manufacturing** | | | | | |
| **Operation:** | **Preparation (Dumping/Mixing)** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.10** | 55.61 | 4.03 | 0.59 | 0.14 | 0.17 | 0.03 |
| **0.11-0.20** | 23.97 | 4.31 | 0.73 | 0.14 | 0.11 | 0 |
| **0.21-0.40** | 5.09 | 2.94 | 0.5 | 0.31 | 0.14 | 0 |
| **>0.40** | 0.28 | 0.7 | 0.06 | 0.03 | 0.12 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 Table 3(a)** | | | | Total | 100.02 |
| **Fiber Type:** | **Crocidolite and Chrysotile** | | | | | |
| **Industry:** | **Cement Manufacturing** | | | | | |
| **Operation:** | **Finishing (Cutting)** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.10** | 93.05 | 3.13 | 0.3 | 0.15 | 0 | 0 |
| **0.11-0.20** | 2.09 | 0.5 | 0.2 | 0 | 0 | 0 |
| **0.21-0.40** | 0.2 | 0 | 0.2 | 0 | 0.1 | 0 |
| **>0.40** | 0 | 0.05 | 0 | 0 | 0.05 | 0 |

## NORMALIZED TO 100

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | Total | 1.00 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Mining and Milling** | | | | | |
| **Operation:** | **Mining** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.060** | 0.3409 | 0.0216 | 0.0025 | 0.0004 | 0.0007 | 0 |
| **0.061-0.100** | 0.2701 | 0.027 | 0.0065 | 0.0007 | 0.0007 | 0 |
| **0.101-0.200** | 0.1994 | 0.0399 | 0.0086 | 0.0043 | 0.0054 | 0.0004 |
| **0.201-0.300** | 0.0331 | 0.0104 | 0.0043 | 0.0011 | 0.0004 | 0.0004 |
| **0.301-0.400** | 0.0065 | 0.004 | 0.0014 | 0 | 0 | 0 |
| **0.401-0.500** | 0.0025 | 0.0022 | 0.0004 | 0 | 0.0004 | 0 |
| **>0.500** | 0 | 0.0019 | 0.0012 | 0 | 0.0007 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | Total | 1.00 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Mining and Milling** | | | | | |
| **Operation:** | **Bagging** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.060** | 0.2689 | 0.0188 | 0.0022 | 0.0011 | 0 | 0 |
| **0.061-0.100** | 0.2473 | 0.0392 | 0.0061 | 0.0039 | 0.0017 | 0 |
| **0.101-0.200** | 0.2280 | 0.0629 | 0.0248 | 0.0077 | 0.0050 | 0 |
| **0.201-0.300** | 0.0260 | 0.0182 | 0.0083 | 0.0022 | 0.0022 | 0 |
| **0.301-0.400** | 0.0050 | 0.0083 | 0.0017 | 0.0011 | 0 | 0 |
| **0.401-0.500** | 0.0022 | 0.0022 | 0.0006 | 0.0006 | 0 | 0 |
| **>0.500** | 0 | 0.0022 | 0.0011 | 0.0006 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | Total | 1.00 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Cement Manufacturing** | | | | | |
| **Operation:** | **Dumping (Preparation)** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.060** | 0.2681 | 0.0124 | 0.0000 | 0.0000 | 0.0004 | 0.0004 |
| **0.061-0.100** | 0.3319 | 0.0244 | 0.0039 | 0.0000 | 0.0004 | 0.0000 |
| **0.101-0.200** | 0.2343 | 0.0356 | 0.0058 | 0.0012 | 0.0000 | 0.0000 |
| **0.201-0.300** | 0.0364 | 0.0186 | 0.0023 | 0.0012 | 0.0004 | 0.0000 |
| **0.301-0.400** | 0.0081 | 0.0062 | 0.0008 | 0.0012 | 0.0004 | 0.0000 |
| **0.401-0.500** | 0.0004 | 0.0027 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **>0.500** | 0.0004 | 0.0020 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

## BINS OF INTEREST BY OPERATION

| | | | | | |
|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | *Index 10* |
| **Fiber Type:** | **Crocidolite** | | | | |
| **Industry:** | **Mining and Milling** | | | | |
| **Operation:** | **Mining** | | | | |
| | L<5 | L5-10 | L>10 | PCME | |
| w<0.25 | 0.9206 | 0.0257 | 0.0076 | 0.0072 | |
| 0.25<w<0.4 | 0.0323 | 0.0041 | 0.0004 | | |
| w<0.4 | 0.9529 | 0.0298 | 0.0080 | | |
| w>0.4 | 0.0066 | 0.0016 | 0.0011 | | |

NOTE: Factor for splitting width bins = 0.5.

| | | | | | |
|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | *Index 11* |
| **Fiber Type:** | **Crocidolite** | | | | |
| **Industry:** | **Mining and Milling** | | | | |
| **Operation:** | **Bagging** | | | | |
| | L<5 | L5-10 | L>10 | PCME | |
| w<0.25 | 0.8871 | 0.0510 | 0.0078 | 0.0120 | |
| 0.25<w<0.4 | 0.0354 | 0.0080 | 0.0011 | | |
| w<0.4 | 0.9225 | 0.0591 | 0.0089 | | |
| w>0.4 | 0.0066 | 0.0029 | 0.0000 | | |

NOTE: Factor for splitting width bins = 0.5.

| | | | | | |
|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | *Index 12* |
| **Fiber Type:** | **Crocidolite** | | | | |
| **Industry:** | **Cement Manufacturing** | | | | |
| **Operation:** | **Dumping (Preparation)** | | | | |
| | L<5 | L5-10 | L>10 | PCME | |
| w<0.25 | 0.9343 | 0.0127 | 0.0014 | 0.0044 | |
| 0.25<w<0.4 | 0.0418 | 0.0038 | 0.0006 | | |
| w<0.4 | 0.9761 | 0.0164 | 0.0020 | | |
| w>0.4 | 0.0055 | 0.0000 | 0.0000 | | |

NOTE: Factor for splitting width bins = 0.5.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | Total | 1.000 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Mining and Milling** | | | | | |
| **Operation:** | **Mining, storage, crushing, bagging** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.10** | 0.55671 | 0.04871 | 0.00760 | 0.00170 | 0.00110 | 0.00000 |
| **0.11-0.20** | 0.22214 | 0.05131 | 0.01430 | 0.00480 | 0.00360 | 0.00010 |
| **0.21-0.40** | 0.04251 | 0.02200 | 0.00780 | 0.00210 | 0.00110 | 0.00010 |
| **>0.40** | 0.00280 | 0.00580 | 0.00190 | 0.00090 | 0.00090 | 0.00000 |

| | | | | | |
|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | | *Index 7* |
| **Fiber Type:** | **Crocidolite** | | | | |
| **Industry:** | **Mining and Milling** | | | | |
| **Operation:** | **Mining, storage, crushing, bagging** | | | | |
| | L<5 | L5-10 | L>10 | PCME | |
| w<0.25 | 0.8840 | 0.0292 | 0.0049 | 0.0139 | |
| 0.25<w<0.4 | 0.0594 | 0.0091 | 0.0011 | | |
| w<0.4 | 0.9434 | 0.0383 | 0.0060 | | |
| w>0.4 | 0.0086 | 0.0028 | 0.0009 | | |

NOTE: Factor for splitting width bins = 0.07875.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 (Table 3a)** | | | | Total | 1.000 |
| **Fiber Type:** | **Crocidolite** | | | | | |
| **Industry:** | **Cement Manufacturing** | | | | | |
| **Operation:** | **Preparation (Dumping/Mixing)** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.10** | 0.5561 | 0.0403 | 0.0059 | 0.0014 | 0.0017 | 0.0003 |
| **0.11-0.20** | 0.2397 | 0.0431 | 0.0073 | 0.0014 | 0.0011 | 0 |
| **0.21-0.40** | 0.0509 | 0.0294 | 0.005 | 0.0031 | 0.0014 | 0 |
| **>0.40** | 0.0028 | 0.007 | 0.0006 | 0.0003 | 0.0012 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 (Table 3a)** | | | | *Index 8* |
| **Fiber Type:** | **Crocidolite** | | | | |
| **Industry:** | **Cement Manufacturing** | | | | |
| **Operation:** | **Preparation (Dumping/Mixing)** | | | | |
| | L<5 | L5-10 | L>10 | PCME | |
| w<0.25 | 0.8855 | 0.0166 | 0.0032 | 0.0109 | |
| 0.25<w<0.4 | 0.0740 | 0.0075 | 0.0013 | | |
| w<0.4 | 0.9595 | 0.0241 | 0.0045 | | |
| w>0.4 | 0.0098 | 0.0009 | 0.0012 | | |

NOTE: Factor for splitting width bins = 0.07875.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 (Table 3a)** | | | | Total | 1.000 |
| **Fiber Type:** | **Crocidolite and Chrysotile** | | | | | |
| **Industry:** | **Cement Manufacturing** | | | | | |
| **Operation:** | **Finishing (Cutting)** | | | | | |
| | **Length (um)** | | | | | |
| **Diameter (um)** | **<=2.50** | **2.51-5.00** | **5.01-7.50** | **7.51-10.00** | **10.01-20.00** | **>20.00** |
| **<=0.10** | 0.93031394 | 0.03129374 | 0.0029994 | 0.0014997 | 0 | 0 |
| **0.11-0.20** | 0.02089582 | 0.004999 | 0.0019996 | 0 | 0 | 0 |
| **0.21-0.40** | 0.0019996 | 0 | 0.0019996 | 0 | 0.0009998 | 0 |
| **>0.40** | 0 | 0.0004999 | 0 | 0 | 0.0004999 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981 (Table 3a)** | | | | *Index 9* |
| **Fiber Type:** | **Crocidolite and Chrysotile** | | | | |
| **Industry:** | **Cement Manufacturing** | | | | |
| **Operation:** | **Finishing (Cutting)** | | | | |
| | L<5 | L5-10 | L>10 | PCME | |
| w<0.25 | 0.9877 | 0.0067 | 0.0001 | 0.0033 | |
| 0.25<w<0.4 | 0.0018 | 0.0018 | 0.0009 | | |
| w<0.4 | 0.9895 | 0.0085 | 0.0010 | | |
| w>0.4 | 0.0005 | 0.0000 | 0.0005 | | |

NOTE: Factor for splitting width bins = 0.07875.

**BINS OF INTEREST ACROSS OPERATIONS**

| | | | | |
|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | *Index* |
| **Fiber Type:** | **Crocidolite** | | | *10, 11* |
| **Industry:** | **Mining and Milling** | | | |
| **Operation:** | **Combined Operations (Mining & Bagging)** | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9039 | 0.0384 | 0.0077 | 0.0096 |
| 0.25<w<0.4 | 0.0338 | 0.0061 | 0.0007 | |
| w<0.4 | 0.9377 | 0.0444 | 0.0084 | |
| w>0.4 | 0.0066 | 0.0022 | 0.0006 | |

NOTE: Factor for splitting width bins = 0.5.

| | | | | |
|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | *Index* |
| **Fiber Type:** | **Crocidolite** | | | *7, 10, 11* |
| **Industry:** | **Mining and Milling** | | | |
| **Operation:** | **Combined (Mining, crushing, storing, bagging)** | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.8973 | 0.0353 | 0.0068 | 0.0111 |
| 0.25<w<0.4 | 0.0424 | 0.0071 | 0.0009 | |
| w<0.4 | 0.9396 | 0.0424 | 0.0076 | |
| w>0.4 | 0.0073 | 0.0024 | 0.0007 | |

| | | | | |
|---|---|---|---|---|
| **Reference:** | **Hwang and Gibbs 1981** | | | *Index* |
| **Fiber Type:** | **Crocidolite** | | | *8, 9 ,12* |
| **Industry:** | **Cement Manufacturing** | | | |
| **Operation:** | **Preparation & Finishing** | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9358 | 0.0120 | 0.0016 | 0.0062 |
| 0.25<w<0.4 | 0.0392 | 0.0044 | 0.0009 | |
| w<0.4 | 0.9750 | 0.0163 | 0.0025 | |
| w>0.4 | 0.0053 | 0.0003 | 0.0006 | |

Factor 0.07875

**Source: Sebastien 1983**

| | Approx. Length | Approx. Diameter | PCME? | Width bin | length bin | Comb |
|---|---|---|---|---|---|---|
| 1 | 1.16 | 0.18 | 0 | 1 | 1 | 11 |
| 2 | 1.4 | 0.18 | 0 | 1 | 1 | 11 |
| 3 | 1.63 | 0.18 | 0 | 1 | 1 | 11 |
| 4 | 1.63 | 0.28 | 0 | 1 | 1 | 11 |
| 5 | 1.63 | 0.36 | 0 | 1 | 1 | 11 |
| 6 | 1.95 | 0.18 | 0 | 1 | 1 | 11 |
| 7 | 2.15 | 0.28 | 0 | 1 | 1 | 11 |
| 8 | 2.25 | 0.18 | 0 | 1 | 1 | 11 |
| 9 | 2.32 | 0.28 | 0 | 1 | 1 | 11 |
| 10 | 2.32 | 0.46 | 0 | 2 | 1 | 21 |
| 11 | 2.35 | 0.18 | 0 | 1 | 1 | 11 |
| 12 | 2.35 | 0.28 | 0 | 1 | 1 | 11 |
| 13 | 2.55 | 0.18 | 0 | 1 | 1 | 11 |
| 14 | 2.8 | 0.18 | 0 | 1 | 1 | 11 |
| 15 | 3.1 | 0.18 | 0 | 1 | 1 | 11 |
| 16 | 3.1 | 0.36 | 0 | 1 | 1 | 11 |
| 17 | 3.13 | 0.18 | 0 | 1 | 1 | 11 |
| 18 | 3.2 | 0.28 | 0 | 1 | 1 | 11 |
| 19 | 3.25 | 0.18 | 0 | 1 | 1 | 11 |
| 20 | 3.25 | 0.36 | 0 | 1 | 1 | 11 |
| 21 | 3.32 | 0.28 | 0 | 1 | 1 | 11 |
| 22 | 3.5 | 0.18 | 0 | 1 | 1 | 11 |
| 23 | 3.5 | 0.28 | 0 | 1 | 1 | 11 |
| 24 | 3.63 | 0.093 | 0 | 1 | 1 | 11 |
| 25 | 3.8 | 0.18 | 0 | 1 | 1 | 11 |
| 26 | 4 | 0.28 | 0 | 1 | 1 | 11 |
| 27 | 4 | 0.36 | 0 | 1 | 1 | 11 |
| 28 | 4.16 | 0.28 | 0 | 1 | 1 | 11 |
| 29 | 4.25 | 0.36 | 0 | 1 | 1 | 11 |
| 30 | 4.4 | 0.56 | 0 | 2 | 1 | 21 |
| 31 | 4.63 | 0.28 | 0 | 1 | 1 | 11 |
| 32 | 5 | 0.18 | 0 | 1 | 2 | 12 |
| 33 | 5 | 0.28 | 0 | 1 | 2 | 12 |
| 34 | 5.16 | 0.28 | 1 | 1 | 2 | 12 |
| 35 | 5.2 | 0.28 | 1 | 1 | 2 | 12 |
| 36 | 5.2 | 1.35 | 1 | 2 | 2 | 22 |
| 37 | 5.5 | 0.36 | 1 | 1 | 2 | 12 |
| 38 | 5.5 | 0.75 | 1 | 2 | 2 | 22 |
| 39 | 6 | 0.56 | 1 | 2 | 2 | 22 |
| 40 | 6.2 | 0.18 | 0 | 1 | 2 | 12 |
| 41 | 6.32 | 0.18 | 0 | 1 | 2 | 12 |
| 42 | 6.5 | 0.18 | 0 | 1 | 2 | 12 |
| 43 | 6.5 | 0.36 | 1 | 1 | 2 | 12 |
| 44 | 6.8 | 0.93 | 1 | 2 | 2 | 22 |
| 45 | 7 | 0.28 | 1 | 1 | 2 | 12 |
| 46 | 7.13 | 0.18 | 0 | 1 | 2 | 12 |
| 47 | 7.16 | 0.18 | 0 | 1 | 2 | 12 |
| 48 | 7.63 | 0.28 | 1 | 1 | 2 | 12 |
| 49 | 7.8 | 0.56 | 1 | 2 | 2 | 22 |
| 50 | 8 | 0.36 | 1 | 1 | 2 | 12 |
| 51 | 8.3 | 0.36 | 1 | 1 | 2 | 12 |
| 52 | 8.4 | 0.36 | 1 | 1 | 2 | 12 |
| 53 | 9 | 0.28 | 1 | 1 | 2 | 12 |
| 54 | 9.16 | 0.66 | 1 | 2 | 2 | 22 |
| 55 | 9.16 | 1.9 | 1 | 2 | 2 | 22 |
| 56 | 9.7 | 0.28 | 1 | 1 | 2 | 12 |
| 57 | 9.7 | 0.66 | 1 | 2 | 2 | 22 |
| 58 | 11 | 0.28 | 1 | 1 | 3 | 13 |
| 59 | 11 | 0.75 | 1 | 2 | 3 | 23 |
| 60 | 11 | 1.2 | 1 | 2 | 3 | 23 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 61 | 11.3 | 0.66 | 1 | 2 | 3 | 23 |
| 62 | 11.5 | 0.36 | 1 | 1 | 3 | 13 |
| 63 | 11.6 | 0.28 | 1 | 1 | 3 | 13 |
| 64 | 11.6 | 0.46 | 1 | 2 | 3 | 23 |
| 65 | 11.8 | 0.28 | 1 | 1 | 3 | 13 |
| 66 | 12.1 | 0.66 | 1 | 2 | 3 | 23 |
| 67 | 12.2 | 0.28 | 1 | 1 | 3 | 13 |
| 68 | 12.2 | 0.56 | 1 | 2 | 3 | 23 |
| 69 | 12.4 | 0.28 | 1 | 1 | 3 | 13 |
| 70 | 12.5 | 0.46 | 1 | 2 | 3 | 23 |
| 71 | 12.5 | 0.75 | 1 | 2 | 3 | 23 |
| 72 | 14.2 | 1.13 | 1 | 2 | 3 | 23 |
| 73 | 14.8 | 0.75 | 1 | 2 | 3 | 23 |
| 74 | 15.4 | 0.93 | 1 | 2 | 3 | 23 |
| 75 | 16 | 0.36 | 1 | 1 | 3 | 13 |
| 76 | 16 | 0.56 | 1 | 2 | 3 | 23 |
| 77 | 16.3 | 0.18 | 0 | 1 | 3 | 13 |
| 78 | 19 | 0.46 | 1 | 2 | 3 | 23 |
| 79 | 21.4 | 0.46 | 1 | 2 | 3 | 23 |
| 80 | 22.5 | 0.75 | 1 | 2 | 3 | 23 |
| 81 | 26.3 | 0.75 | 1 | 2 | 3 | 23 |
| 82 | 30 | 0.46 | 1 | 2 | 3 | 23 |
| 83 | 32.2 | 1.27 | 1 | 2 | 3 | 23 |
| 84 | 33.6 | 0.56 | 1 | 2 | 3 | 23 |
| 85 | 34 | 1.16 | 1 | 2 | 3 | 23 |
| 86 | 68 | 0.28 | 1 | 1 | 3 | 13 |
| 87 | 3.63 | 0.28 | 0 | 1 | 1 | 11 |
| 88 | 3.63 | 0.36 | 0 | 1 | 1 | 11 |
| 89 | 1.33 | 0.28 | 0 | 1 | 1 | 11 |
| 90 | 1.63 | 0.28 | 0 | 1 | 1 | 11 |
| 91 | 1.85 | 0.18 | 0 | 1 | 1 | 11 |
| 92 | 2.25 | 0.18 | 0 | 1 | 1 | 11 |
| 93 | 2.28 | 0.28 | 0 | 1 | 1 | 11 |
| 94 | 2.55 | 0.28 | 0 | 1 | 1 | 11 |
| 95 | 3.25 | 0.18 | 0 | 1 | 1 | 11 |
| 96 | 3.5 | 0.28 | 0 | 1 | 1 | 11 |
| 97 | 4.25 | 0.36 | 0 | 1 | 1 | 11 |
| 98 | 4.63 | 0.18 | 0 | 1 | 1 | 11 |
| 99 | 4.63 | 0.46 | 0 | 2 | 1 | 21 |
| 100 | 5 | 0.28 | 0 | 1 | 2 | 12 |
| 101 | 5.16 | 0.66 | 1 | 2 | 2 | 22 |
| 102 | 5.16 | 0.18 | 0 | 1 | 2 | 12 |
| 103 | 5.2 | 0.46 | 1 | 2 | 2 | 22 |
| 104 | 5.22 | 0.93 | 1 | 2 | 2 | 22 |
| 105 | 5.32 | 0.28 | 1 | 1 | 2 | 12 |
| 106 | 5.63 | 1.16 | 1 | 2 | 2 | 22 |
| 107 | 6 | 0.18 | 0 | 1 | 2 | 12 |
| 108 | 6.5 | 0.18 | 0 | 1 | 2 | 12 |
| 109 | 6.5 | 0.28 | 1 | 1 | 2 | 12 |
| 110 | 6.5 | 0.75 | 1 | 2 | 2 | 22 |
| 111 | 7.25 | 0.18 | 0 | 1 | 2 | 12 |
| 112 | 7.4 | 0.46 | 1 | 2 | 2 | 22 |
| 113 | 8.16 | 0.28 | 1 | 1 | 2 | 12 |
| 114 | 8.6 | 0.28 | 1 | 1 | 2 | 12 |
| 115 | 9 | 0.66 | 1 | 2 | 2 | 22 |
| 116 | 9.15 | 0.36 | 1 | 1 | 2 | 12 |
| 117 | 9.15 | 1.16 | 1 | 2 | 2 | 22 |
| 118 | 9.32 | 0.66 | 1 | 2 | 2 | 22 |
| 119 | 9.6 | 0.28 | 1 | 1 | 2 | 12 |
| 120 | 9.6 | 1.13 | 1 | 2 | 2 | 22 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 121 | 10.1 | 1.27 | 1 | 2 | 3 | 23 |
| 122 | 10.1 | 1.9 | 1 | 2 | 3 | 23 |
| 123 | 10.4 | 0.28 | 1 | 1 | 3 | 13 |
| 124 | 11.6 | 0.56 | 1 | 2 | 3 | 23 |
| 125 | 11.8 | 0.46 | 1 | 2 | 3 | 23 |
| 126 | 12 | 0.56 | 1 | 2 | 3 | 23 |
| 127 | 12 | 1.16 | 1 | 2 | 3 | 23 |
| 128 | 12.1 | 0.66 | 1 | 2 | 3 | 23 |
| 129 | 15 | 1.9 | 1 | 2 | 3 | 23 |
| 130 | 18 | 1.16 | 1 | 2 | 3 | 23 |
| 131 | 22.5 | 0.28 | 1 | 1 | 3 | 13 |
| 132 | 27.5 | 0.66 | 1 | 2 | 3 | 23 |
| 133 | 29 | 0.66 | 1 | 2 | 3 | 23 |
| 134 | 34 | 0.75 | 1 | 2 | 3 | 23 |
| 135 | 1.13 | 0.18 | 0 | 1 | 1 | 11 |
| 136 | 1.32 | 0.18 | 0 | 1 | 1 | 11 |
| 137 | 1.32 | 0.28 | 0 | 1 | 1 | 11 |
| 138 | 1.6 | 0.18 | 0 | 1 | 1 | 11 |
| 139 | 1.6 | 0.28 | 0 | 1 | 1 | 11 |
| 140 | 1.85 | 0.093 | 0 | 1 | 1 | 11 |
| 141 | 1.85 | 0.18 | 0 | 1 | 1 | 11 |
| 142 | 2.16 | 0.18 | 0 | 1 | 1 | 11 |
| 143 | 2.16 | 0.36 | 0 | 1 | 1 | 11 |
| 144 | 2.25 | 0.18 | 0 | 1 | 1 | 11 |
| 145 | 2.35 | 0.28 | 0 | 1 | 1 | 11 |
| 146 | 2.55 | 0.28 | 0 | 1 | 1 | 11 |
| 147 | 2.8 | 0.18 | 0 | 1 | 1 | 11 |
| 148 | 2.8 | 0.28 | 0 | 1 | 1 | 11 |
| 149 | 2.8 | 0.36 | 0 | 1 | 1 | 11 |
| 150 | 2.8 | 0.46 | 0 | 2 | 1 | 21 |
| 151 | 2.9 | 0.18 | 0 | 1 | 1 | 11 |
| 152 | 3.1 | 0.93 | 0 | 2 | 1 | 21 |
| 153 | 3.16 | 0.28 | 0 | 1 | 1 | 11 |
| 154 | 3.16 | 0.75 | 0 | 2 | 1 | 21 |
| 155 | 3.25 | 0.28 | 0 | 1 | 1 | 11 |
| 156 | 3.32 | 0.28 | 0 | 1 | 1 | 11 |
| 157 | 3.32 | 0.36 | 0 | 1 | 1 | 11 |
| 158 | 3.5 | 0.66 | 0 | 2 | 1 | 21 |
| 159 | 3.63 | 0.18 | 0 | 1 | 1 | 11 |
| 160 | 3.63 | 0.28 | 0 | 1 | 1 | 11 |
| 161 | 4 | 0.18 | 0 | 1 | 1 | 11 |
| 162 | 4.16 | 0.28 | 0 | 1 | 1 | 11 |
| 163 | 4.25 | 0.28 | 0 | 1 | 1 | 11 |
| 164 | 4.35 | 0.18 | 0 | 1 | 1 | 11 |
| 165 | 4.4 | 0.18 | 0 | 1 | 1 | 11 |
| 166 | 4.63 | 0.18 | 0 | 1 | 1 | 11 |
| 167 | 5 | 0.18 | 0 | 1 | 2 | 12 |
| 168 | 4.63 | 0.46 | 0 | 2 | 1 | 21 |
| 169 | 5 | 0.36 | 0 | 1 | 2 | 12 |
| 170 | 5.2 | 0.36 | 1 | 1 | 2 | 12 |
| 171 | 5.25 | 0.18 | 0 | 1 | 2 | 12 |
| 172 | 5.4 | 0.18 | 0 | 1 | 2 | 12 |
| 173 | 5.5 | 0.18 | 0 | 1 | 2 | 12 |
| 174 | 5.5 | 0.46 | 1 | 2 | 2 | 22 |
| 175 | 5.8 | 0.18 | 0 | 1 | 2 | 12 |
| 176 | 6.13 | 0.66 | 1 | 2 | 2 | 22 |
| 177 | 6.35 | 0.093 | 0 | 1 | 2 | 12 |
| 178 | 6.5 | 0.13 | 0 | 1 | 2 | 12 |
| 179 | 6.5 | 0.18 | 0 | 1 | 2 | 12 |
| 180 | 6.5 | 0.23 | 0 | 1 | 2 | 12 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 181 | 6.63 | 1.35 | 1 | 2 | 2 | 22 |
| 182 | 7.15 | 0.28 | 1 | 1 | 2 | 12 |
| 183 | 7.15 | 0.32 | 1 | 1 | 2 | 12 |
| 184 | 7.15 | 0.46 | 1 | 2 | 2 | 22 |
| 185 | 7.15 | 1.2 | 1 | 2 | 2 | 22 |
| 186 | 7.16 | 0.36 | 1 | 1 | 2 | 12 |
| 187 | 7.3 | 0.28 | 1 | 1 | 2 | 12 |
| 188 | 7.9 | 0.18 | 0 | 1 | 2 | 12 |
| 189 | 8 | 0.36 | 1 | 1 | 2 | 12 |
| 190 | 8.1 | 0.18 | 0 | 1 | 2 | 12 |
| 191 | 8.1 | 0.46 | 1 | 2 | 2 | 22 |
| 192 | 8.1 | 1.63 | 1 | 2 | 2 | 22 |
| 193 | 8.3 | 0.28 | 1 | 1 | 2 | 12 |
| 194 | 8.63 | 0.28 | 1 | 1 | 2 | 12 |
| 195 | 9.32 | 0.36 | 1 | 1 | 2 | 12 |
| 196 | 9.7 | 0.46 | 1 | 2 | 2 | 22 |
| 197 | 10 | 0.18 | 0 | 1 | 2 | 12 |
| 198 | 10 | 0.28 | 1 | 1 | 2 | 12 |
| 199 | 10.3 | 0.28 | 1 | 1 | 3 | 13 |
| 200 | 10.6 | 0.36 | 1 | 1 | 3 | 13 |
| 201 | 11.1 | 0.66 | 1 | 2 | 3 | 23 |
| 202 | 11.3 | 0.36 | 1 | 1 | 3 | 13 |
| 203 | 11.6 | 0.46 | 1 | 2 | 3 | 23 |
| 204 | 11.8 | 0.28 | 1 | 1 | 3 | 13 |
| 205 | 12 | 0.46 | 1 | 2 | 3 | 23 |
| 206 | 14.2 | 0.36 | 1 | 1 | 3 | 13 |
| 207 | 15.4 | 0.56 | 1 | 2 | 3 | 23 |
| 208 | 16 | 0.28 | 1 | 1 | 3 | 13 |
| 209 | 16.3 | 0.18 | 0 | 1 | 3 | 13 |
| 210 | 16.3 | 0.23 | 0 | 1 | 3 | 13 |
| 211 | 17 | 0.56 | 1 | 2 | 3 | 23 |
| 212 | 19 | 0.18 | 0 | 1 | 3 | 13 |
| 213 | 22 | 0.18 | 0 | 1 | 3 | 13 |
| 214 | 22 | 0.28 | 1 | 1 | 3 | 13 |
| 215 | 24 | 0.28 | 1 | 1 | 3 | 13 |
| 216 | 25 | 1.16 | 1 | 2 | 3 | 23 |
| 217 | 29 | 1.63 | 1 | 2 | 3 | 23 |
| 218 | 35 | 0.36 | 1 | 1 | 3 | 13 |
| 219 | 41.3 | 1.16 | 1 | 2 | 3 | 23 |
| 220 | 45 | 0.93 | 1 | 2 | 3 | 23 |
| 221 | 65 | 1.63 | 1 | 2 | 3 | 23 |

COUNT

| | Length | | | |
|---|---|---|---|---|
| width | < 5 | 5-10 | > 10 | |
| < 0.4 | 69 | 52 | 24 | |
| > 0.4 | 8 | 26 | 42 | 221 |

PCME 114

FRACTION

| | Length | | | |
|---|---|---|---|---|
| width | < 5 | 5-10 | > 10 | |
| < 0.4 | 0.31 | 0.24 | 0.11 | 0.66 |
| > 0.4 | 0.04 | 0.12 | 0.19 | 0.34 |
| | 0.35 | 0.35 | 0.30 | 1.00 |

PCME 0.52

**SUMMARY OF TEM MATCH TO EPIDEMIOLOGY STUDY_LUNG CANCER**

**British Friction Products**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 16, 17, 18 |
| Industry: | Friction Products | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7956 | 0.0302 | 0.0230 | 0.0642 |
| 0.25<w<0.4 | 0.0537 | 0.0088 | 0.0084 | |
| w < 0.4 | 0.8492 | 0.0390 | 0.0314 | |
| w > 0.4 | 0.0334 | 0.0155 | 0.0315 | |

**Amphibole**

| Reference: | H&G 1981; G&H 1980 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 3,4,7,8,9 |
| Industry: | Cement Manufacturing<br>Mining & Milling | | | 10,11,12 |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9133 | 0.0273 | 0.0052 | 0.0089 |
| 0.25<w<0.4 | 0.0392 | 0.0060 | 0.0010 | |
| w<0.4 | 0.9525 | 0.0333 | 0.0061 | |
| w>0.4 | 0.0062 | 0.0014 | 0.0005 | |

**South Carolina Textiles**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 13, 14 ,15 |
| Industry: | Textile Products | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.6978 | 0.0368 | 0.0334 | 0.1166 |
| 0.25<w<0.4 | 0.0687 | 0.0128 | 0.0153 | |
| w < 0.4 | 0.7665 | 0.0495 | 0.0488 | |
| w > 0.4 | 0.0467 | 0.0329 | 0.0556 | |

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Tremolite | | | 27 |
| Industry: | Talc Production<br>(Mining & Milling) | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.6176 | 0.0035 | 0.0000 | 0.0318 |
| 0.25<w<0.4 | 0.1674 | 0.0077 | 0.0027 | |
| w < 0.4 | 0.7849 | 0.0112 | 0.0027 | |
| w > 0.4 | 0.1798 | 0.0177 | 0.0038 | |

**U.S. Retirees (Amosite only)**

**Chrysotile**

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Amosite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg.<br>Mining/Milling | | | 1,2 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.3289 | 0.0417 | 0.0119 | 0.2458 |
| 0.25<w<0.4 | 0.1852 | 0.0559 | 0.0275 | |
| w < 0.4 | 0.5141 | 0.0976 | 0.0394 | |
| w > 0.4 | 0.1865 | 0.0762 | 0.0861 | |

**U.S. Retirees (Chrysotile only)**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 5,6,13,14,15 |
| Industry: | All Industry (Mining, textiles,<br>friction products, Cement mfg.) | | | 16,17,18<br>19,20,21 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8022 | 0.0274 | 0.0209 | 0.0638 |
| 0.25<w<0.4 | 0.0557 | 0.0097 | 0.0083 | |
| w < 0.4 | 0.8579 | 0.0371 | 0.0292 | |
| w > 0.4 | 0.0300 | 0.0171 | 0.0287 | |

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Industry: | Talc Production<br>(Mining/Milling) | | | 27 |
| | Length | | | |
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.6176 | 0.0035 | 0.0000 | 0.0318 |
| 0.25-0.4 | 0.1674 | 0.0077 | 0.0027 | |
| < 0.4 | 0.7849 | 0.0112 | 0.0027 | |
| > 0.4 | 0.1798 | 0.0177 | 0.0038 | |

**U.S. Retirees (Mixed - Chrysotile & crocidolite)**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| Reference: | H&G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 8, 9 ,12 |
| Industry: | Cement Manufacturing | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9358 | 0.0120 | 0.0016 | 0.0062 |
| 0.25<w<0.4 | 0.0392 | 0.0044 | 0.0009 | |
| w<0.4 | 0.9750 | 0.0163 | 0.0025 | |
| w>0.4 | 0.0053 | 0.0003 | 0.0006 | |

**Ontario Cement Mfg.**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| Reference: | H&G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 8, 9 ,12 |
| Industry: | Cement Manufacturing | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9358 | 0.0120 | 0.0016 | 0.0062 |
| 0.25<w<0.4 | 0.0392 | 0.0044 | 0.0009 | |
| w<0.4 | 0.9750 | 0.0163 | 0.0025 | |
| w>0.4 | 0.0053 | 0.0003 | 0.0006 | |

**New Orleans (plant 1)**

**Chrysotile**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979 | | | Index |
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979, H& G 1981 | | | Index |
| Fiber Type: | Amosite and Crodolite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg. | | | 8, 9, 12 |
| | Mining/Milling, Cement Mfg | | | 1,2 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.5565 | 0.0306 | 0.0080 | 0.1559 |
| 0.25<w<0.4 | 0.1305 | 0.0365 | 0.0176 | |
| w < 0.4 | 0.6870 | 0.0671 | 0.0256 | |
| w > 0.4 | 0.1185 | 0.0478 | 0.0541 | |

**New Orleans (plant 2 chrysotile only)**

**Chrysotile**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979 | | | Index |
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979 | | | Index |
| Industry: | Talc Production | | | 27 |
| Operation: | Mining/Milling | | | |
| | Length | | | |
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.6176 | 0.0035 | 0.0000 | 0.0318 |
| 0.25-0.4 | 0.1674 | 0.0077 | 0.0027 | |
| < 0.4 | 0.7849 | 0.0112 | 0.0027 | |
| > 0.4 | 0.1798 | 0.0177 | 0.0038 | |

**New Orleans (plant 2 chrysotile and crocidolite)**

**Chrysotile**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979 | | | Index |
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| | | | | |
|---|---|---|---|---|
| Reference: | H&G 1981 | | | Index |
| Fiber Type: | Crocidolite | | | 8, 9 ,12 |
| Industry: | Cement Pipe Mfg | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9358 | 0.0120 | 0.0016 | 0.0062 |
| 0.25<w<0.4 | 0.0392 | 0.0044 | 0.0009 | |
| w<0.4 | 0.9750 | 0.0163 | 0.0025 | |
| w>0.4 | 0.0053 | 0.0003 | 0.0006 | |

**Quebec**

**Chrysotile**

| | | | | |
|---|---|---|---|---|
| G&H 1980 | | | | Index 5, 6 |
| Fiber Type: Chrysotile | | | | |
| Industry: Mining/Milling | | | | |
| | Length | | | |
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.9448 | 0.0104 | 0.0033 | 0.0133 |
| 0.25-0.4 | 0.0194 | 0.0058 | 0.0020 | |
| < 0.4 | 0.9642 | 0.0162 | 0.0053 | |
| > 0.4 | 0.0088 | 0.0042 | 0.0013 | |

**Amphibole**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979 | | | Index |
| Industry: | Talc Production | | | 27 |
| Operation: | Mining/Milling | | | |
| | Length | | | |
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.6176 | 0.0035 | 0.0000 | 0.0318 |
| 0.25-0.4 | 0.1674 | 0.0077 | 0.0027 | |
| < 0.4 | 0.7849 | 0.0112 | 0.0027 | |
| > 0.4 | 0.1798 | 0.0177 | 0.0038 | |

**Pennsylvania**

**Chrysotile**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979 | | | Index |
| Fiber Type: | Chrysotile | | | 13, 14, 15 |
| Industry: | Friction Products & Textiles | | | 16, 17, 18 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7467 | 0.0335 | 0.0282 | 0.0904 |
| 0.25<w<0.4 | 0.0612 | 0.0108 | 0.0119 | |
| w < 0.4 | 0.8078 | 0.0443 | 0.0401 | |
| w > 0.4 | 0.0401 | 0.0242 | 0.0435 | |

**Amphibole**

| | | | | |
|---|---|---|---|---|
| Reference: | D&H 1979; H&G 1981 | | | Index |
| Fiber Type: | Amosite and Crodolite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg. | | | 3,4,7,8,9 |
| | Mining/Milling | | | 10,11,12 |
| | Cement Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7247 | 0.0317 | 0.0074 | 0.0932 |
| 0.25<w<0.4 | 0.0679 | 0.0170 | 0.0082 | |
| w < 0.4 | 0.7927 | 0.0488 | 0.0156 | |
| w > 0.4 | 0.0750 | 0.0306 | 0.0374 | |

**Connecticut**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 16, 17, 18 |
| Industry: | Friction Products | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7956 | 0.0302 | 0.0230 | 0.0642 |
| 0.25<w<0.4 | 0.0537 | 0.0088 | 0.0084 | |
| w < 0.4 | 0.8492 | 0.0390 | 0.0314 | |
| w > 0.4 | 0.0334 | 0.0155 | 0.0315 | |

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Anthophyllite | | | 25, 26 |
| Industry: | Talc Production (Mining/Milling) | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7027 | 0.0170 | 0.0031 | 0.0849 |
| 0.25<w<0.4 | 0.1182 | 0.0134 | 0.0103 | |
| w < 0.4 | 0.8209 | 0.0304 | 0.0135 | |
| w > 0.4 | 0.0741 | 0.0410 | 0.0201 | |

**Rochdale, England**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 13, 14 ,15 |
| Industry: | Textile Products | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.6978 | 0.0368 | 0.0334 | 0.1166 |
| 0.25<w<0.4 | 0.0687 | 0.0128 | 0.0153 | |
| w < 0.4 | 0.7665 | 0.0495 | 0.0488 | |
| w > 0.4 | 0.0467 | 0.0329 | 0.0556 | |

**Amphibole**

| Reference: | H&G 1981, G&H 1980 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 3.4.7.8.9 |
| Industry: | Mining/Milling, Cement Mfg. | | | 10, 11, 12 |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9133 | 0.0273 | 0.0052 | 0.0089 |
| 0.25<w<0.4 | 0.0392 | 0.0060 | 0.0010 | |
| w<0.4 | 0.9525 | 0.0333 | 0.0061 | |
| w>0.4 | 0.0062 | 0.0014 | 0.0005 | |

**Italian Miners**

**Chrysotile**

| Reference: | G&H 1980 | | | Index 5, 6 |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | |
| Industry: | Mining & Milling | | | |
| | Length | | | |
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.9448 | 0.0104 | 0.0033 | 0.0133 |
| 0.25-0.4 | 0.0194 | 0.0058 | 0.0020 | |
| < 0.4 | 0.9642 | 0.0162 | 0.0053 | |
| > 0.4 | 0.0088 | 0.0042 | 0.0013 | |

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Industry: | Talc Production (Mining/Milling) | | | 27 |
| | Length | | | |
| Width | 0-5 | 5-10 | >10 | PCME |
| < 0.25 | 0.6176 | 0.0035 | 0.0000 | 0.0318 |
| 0.25-0.4 | 0.1674 | 0.0077 | 0.0027 | |
| < 0.4 | 0.7849 | 0.0112 | 0.0027 | |
| > 0.4 | 0.1798 | 0.0177 | 0.0038 | |

**New Jersey Insulations Mfg.**

**Chrysotile**

| Reference: | D&H 1979, G&H 1980 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 5,6,13,14 |
| Industry: | All Industry (Mining, textiles, friction products, Cement mfg.) | | | 15,16,17 18,19,20,21 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8022 | 0.0274 | 0.0209 | 0.0638 |
| 0.25<w<0.4 | 0.0557 | 0.0097 | 0.0083 | |
| w < 0.4 | 0.8579 | 0.0371 | 0.0292 | |
| w > 0.4 | 0.0300 | 0.0171 | 0.0287 | |

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Amosite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.2220 | 0.0435 | 0.0134 | 0.3181 |
| 0.25<w<0.4 | 0.1446 | 0.0464 | 0.0274 | |
| w < 0.4 | 0.3666 | 0.0899 | 0.0409 | |
| w > 0.4 | 0.2584 | 0.1084 | 0.1359 | |

**Swedish Cement Mfg.**

**Chrysotile**

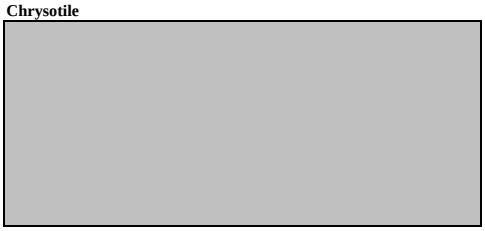
| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| Reference: | D&H 1979, H& G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Amosite and Crodolite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg. Mining/Milling, Cement Mfg | | | 1,2, 8, 9, 12 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.5565 | 0.0306 | 0.0080 | 0.1559 |
| 0.25<w<0.4 | 0.1305 | 0.0365 | 0.0176 | |
| w < 0.4 | 0.6870 | 0.0671 | 0.0256 | |
| w > 0.4 | 0.1185 | 0.0478 | 0.0541 | |

**Libby, MT Miners**

**Chrysotile**

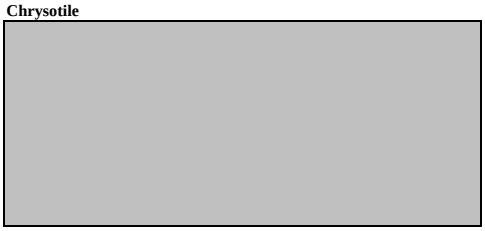


**Amphibole**

| | Length | | | Index 28 |
|---|---|---|---|---|
| width | < 5 | 5-10 | > 10 | PCME |
| < 0.4 | 0.31 | 0.24 | 0.11 | 0.52 |
| > 0.4 | 0.04 | 0.12 | 0.19 | |

**Australia**

**Chrysotile**



**Amphibole**

| Reference: | H&G 1981 | | | Index |
|---|---|---|---|---|
| | Gibbs and Hwang 1980 | | | 7, 10, 11 |
| Fiber Type: | Crocidolite | | | 3, 4 |
| Industry: | Mining and Milling | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.8997 | 0.0365 | 0.0073 | 0.0105 |
| 0.25<w<0.4 | 0.0392 | 0.0070 | 0.0010 | |
| w<0.4 | 0.9389 | 0.0435 | 0.0083 | |
| w>0.4 | 0.0067 | 0.0020 | 0.0005 | |

**Belgium Cement Mfg.**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| Reference: | D&H 1979, H& G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Amosite and Crodolite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg. | | | 1,2, 8, 9, 12 |
| | Mining/Milling, Cement Mfg | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.5565 | 0.0306 | 0.0080 | 0.1559 |
| 0.25<w<0.4 | 0.1305 | 0.0365 | 0.0176 | |
| w < 0.4 | 0.6870 | 0.0671 | 0.0256 | |
| w > 0.4 | 0.1185 | 0.0478 | 0.0541 | |

**Austrian Cement Mfg.**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

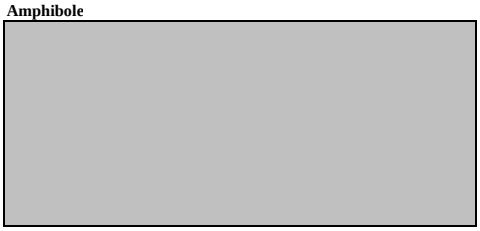
| Reference: | H&G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 8, 9 ,12 |
| Industry: | Cement Manufacturing | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9358 | 0.0120 | 0.0016 | 0.0062 |
| 0.25<w<0.4 | 0.0392 | 0.0044 | 0.0009 | |
| w<0.4 | 0.9750 | 0.0163 | 0.0025 | |
| w>0.4 | 0.0053 | 0.0003 | 0.0006 | |

**China**

**Chrysotile**

| Reference: | Dement and Harris 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 13 - 21 |
| Industry: | Textiles, Friction Products | | | |
| | Cement Pipe Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7705 | 0.0312 | 0.0248 | 0.0750 |
| 0.25<w<0.4 | 0.0637 | 0.0105 | 0.0097 | |
| w < 0.4 | 0.8343 | 0.0417 | 0.0345 | |
| w > 0.4 | 0.0347 | 0.0200 | 0.0348 | |

**Amphibole**



**SUMMARY OF TEM MATCH TO EPIDEMIOLOGY STUDY_MESOTHELIOMA**

**South Carolina**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 13, 14 ,15 |
| Industry: | Textile Products | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.6978 | 0.0368 | 0.0334 | 0.1166 |
| 0.25<w<0.4 | 0.0687 | 0.0128 | 0.0153 | |
| w < 0.4 | 0.7665 | 0.0495 | 0.0488 | |
| w > 0.4 | 0.0467 | 0.0329 | 0.0556 | |

**Amphibole**

| Reference: | H&G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Tremolite | | | 27 |
| Industry: | Talc Production (Mining/Milling) | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.6176 | 0.0035 | 0.0000 | 0.0318 |
| 0.25<w<0.4 | 0.1674 | 0.0077 | 0.0027 | |
| w<0.4 | 0.7849 | 0.0112 | 0.0027 | |
| w>0.4 | 0.1798 | 0.0177 | 0.0038 | |

**Ontario**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| Reference: | H&G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 8, 9 ,12 |
| Industry: | Cement Manufacturing | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9358 | 0.0120 | 0.0016 | 0.0062 |
| 0.25<w<0.4 | 0.0392 | 0.0044 | 0.0009 | |
| w<0.4 | 0.9750 | 0.0163 | 0.0025 | |
| w>0.4 | 0.0053 | 0.0003 | 0.0006 | |

**Pennsylvania**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 13, 14, 15 |
| Industry: | Friction Products, Textiles | | | 16, 17, 18 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7467 | 0.0335 | 0.0282 | 0.0904 |
| 0.25<w<0.4 | 0.0612 | 0.0108 | 0.0119 | |
| w < 0.4 | 0.8078 | 0.0443 | 0.0401 | |
| w > 0.4 | 0.0401 | 0.0242 | 0.0435 | |

**Amphibole**

| Reference: | D&H 1979; H&G 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Amosite and Crodolite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg. | | | 3,4,7,8,9 10,11,12 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7247 | 0.0317 | 0.0074 | 0.0932 |
| 0.25<w<0.4 | 0.0679 | 0.0170 | 0.0082 | |
| w < 0.4 | 0.7927 | 0.0488 | 0.0156 | |
| w > 0.4 | 0.0750 | 0.0306 | 0.0374 | |

**Connecticut**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 16, 17, 18 |
| Industry: | Friction Products | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7956 | 0.0302 | 0.0230 | 0.0642 |
| 0.25<w<0.4 | 0.0537 | 0.0088 | 0.0084 | |
| w < 0.4 | 0.8492 | 0.0390 | 0.0314 | |
| w > 0.4 | 0.0334 | 0.0155 | 0.0315 | |

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Anthophyllite | | | 25, 26 |
| Industry: | Talc Production (Mining/Milling) | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7027 | 0.0170 | 0.0031 | 0.0849 |
| 0.25<w<0.4 | 0.1182 | 0.0134 | 0.0103 | |
| w < 0.4 | 0.8209 | 0.0304 | 0.0135 | |
| w > 0.4 | 0.0741 | 0.0410 | 0.0201 | |

**Rochdale, England**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 13, 14 ,15 |
| Industry: | Textile Products | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.6978 | 0.0368 | 0.0334 | 0.1166 |
| 0.25<w<0.4 | 0.0687 | 0.0128 | 0.0153 | |
| w < 0.4 | 0.7665 | 0.0495 | 0.0488 | |
| w > 0.4 | 0.0467 | 0.0329 | 0.0556 | |

**Amphibole**

| Reference: | H&G 1981, G&H 1980 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 3.4.7.8.9 |
| Industry: | Mining/Milling, Cement Mfg. | | | 10, 11, 12 |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9133 | 0.0273 | 0.0052 | 0.0089 |
| 0.25<w<0.4 | 0.0392 | 0.0060 | 0.0010 | |
| w<0.4 | 0.9525 | 0.0333 | 0.0061 | |
| w>0.4 | 0.0062 | 0.0014 | 0.0005 | |

**New Jersey**

**Chrysotile**

| Reference: | D&H 1979, G&H 1980 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 5,6,13,14 |
| Industry: | All Industry (Mining, textiles, friction products, Cement mfg.) | | | 15,16,17 18,19,20,21 |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8022 | 0.0274 | 0.0209 | 0.0638 |
| 0.25<w<0.4 | 0.0557 | 0.0097 | 0.0083 | |
| w < 0.4 | 0.8579 | 0.0371 | 0.0292 | |
| w > 0.4 | 0.0300 | 0.0171 | 0.0287 | |

**Amphibole**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Amosite | | | 22, 23, 24 |
| Industry: | Pipe Insulation Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.2220 | 0.0435 | 0.0134 | 0.3181 |
| 0.25<w<0.4 | 0.1446 | 0.0464 | 0.0274 | |
| w < 0.4 | 0.3666 | 0.0899 | 0.0409 | |
| w > 0.4 | 0.2584 | 0.1084 | 0.1359 | |

**Israel**

**Chrysotile**

| Reference: | D&H 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 19, 20, 21 |
| Industry: | Cement Pipe | | | |
| Operation: | All Operations | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.8182 | 0.0266 | 0.0180 | 0.0443 |
| 0.25<w<0.4 | 0.0689 | 0.0100 | 0.0053 | |
| w < 0.4 | 0.8871 | 0.0366 | 0.0233 | |
| w > 0.4 | 0.0240 | 0.0116 | 0.0174 | |

**Amphibole**

| Reference: | Hwang and Gibbs 1981 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Crocidolite | | | 8, 9 ,12 |
| Industry: | Cement Manufacturing | | | |
| Operation: | Preparation & Finishing | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w<0.25 | 0.9358 | 0.0120 | 0.0016 | 0.0062 |
| 0.25<w<0.4 | 0.0392 | 0.0044 | 0.0009 | |
| w<0.4 | 0.9750 | 0.0163 | 0.0025 | |
| w>0.4 | 0.0053 | 0.0003 | 0.0006 | |

**China**

**Chrysotile**

| Reference: | Dement and Harris 1979 | | | Index |
|---|---|---|---|---|
| Fiber Type: | Chrysotile | | | 13 - 21 |
| Industry: | Textiles, Friction Products Cement Pipe Mfg. | | | |
| | L<5 | L5-10 | L>10 | PCME |
| w <0.25 | 0.7705 | 0.0312 | 0.0248 | 0.0750 |
| 0.25<w<0.4 | 0.0637 | 0.0105 | 0.0097 | |
| w < 0.4 | 0.8343 | 0.0417 | 0.0345 | |
| w > 0.4 | 0.0347 | 0.0200 | 0.0348 | |

**Amphibole**