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IS 9691 (1980): Method of test for length distribution (wet classification of fibre length) of chrysotile asbestos

fibre using Bauer Mcnett classifier [CED 53: Cement Matrix Products]

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Indian Standard METHOD OF TEST FOR LENGTH DISTRIBUTION (WET CLASSIFICATION OF FIBRE LENGTH) OF CHRYSOTILE ASBESTOS FIBRE USING BAUER-MCNETT CLASSIFIER

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Indian Standard

METHOD OF TEST FOR LENGTH DISTRIBUTION (WET CLASSIFICATION OF FIBRE LENGTH) OF CHRYSOTILE ASBESTOS FIBRE USING BAUER-MCNETT CLASSIFIER

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 December 1980, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 A series of standards on testing procedures of asbestos fibre are being formulated so as to provide standard methods for obtaining physical and chemical properties of asbestos fibre which is used for manufacturing various asbestos cement products like asbestos cement sheets, asbestos cement pipes, etc. These testing procedures will be useful both for mine owners and the manufacturers of asbestos cement products provided they have the facilities to make these tests with reasonable accuracy and the personnel with the required degree of laboratory experience. These standards which will define the properties of fibre fit for use in manufacturing asbestos cement products will also be helpful in utilizing indigenous asbestos fibre for various asbestos cement products.

0.3 This standard covers the method of determining the length distribution of chrysotile asbestos fibre by wet classification. The test for length distribution can be performed by either Bauer-McNett classifier or T & N classifier; but this standard covers the method of test by Bauer-McNett classifier only.

0.4 In the formulation of this standard, due weightage has been given to international coordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by basing the standard on 'Chrysotile Asbestos Test Manual' 1974 (Revised 1978). Asbestos Textile Institute, Inc. and Quebec Asbestos Mining Association.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: $2-1960^*$.

^{*}Rules for rounding off numerical values (revised).

IS: 9691 - 1980

The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the method of test for the determination of the length distribution and fines content of milled chrysotile asbestos fibre by wet classification employing the Bauer-McNett fibre classifier.

2. APPARATUS

2.1 Bauer-McNett Fibre Classifier (see Fig. 1) — Preferably equipped with vacuum suction cups for drainage.

2.1.1 The classifier utilizes 4 (5 optional) elliptical tanks arranged in cascade. Material introduced into the highest tank passes by gravity through the other three. Each of the four tanks has a screen of different mesh which holds back the fibres greater in length than the size of the openings. Each tank is equipped with a vertical cylindrical agitator with small vertical fins. A midfeather is installed parallel to the screen in each tank. Circulation is thus maintained in each tank at a high uniform velocity across the screen face with a comparatively low velocity through the screen. This keeps the fibres parallel to the screen and, at the same time, provides a gentle separating action. This action carries the shorter fibres through the wire. It also keeps the fibres from setting in tank also.

NOTE — Drainage through muslin filter cloths or 75 micron IS Sieve (45 micron IS Sieve for float products) is acceptable.

2.2 Accessories — The following accessories shall be provided:

- a) Balance (Sensitivity 0.01 g).
- b) One 1 000-ml beaker and a stirring rod.
- c) Filter papers to fit vacuum cups on classifier or 45 micron screen cloth filter mounted in a suitable metal ring.
- d) T-shaped soft rubber scraper for cleaning screens.
- e) Rubber pressure hose, 6 mm bore, with control valve nozzle for rinsing classifier screens and tanks with filtered water.
- f) Drying oven (convection type, or mechanical draught) or infra-red drying unit.
- g) Automatic overflow alarm.
- h) Automatic clearing device on the fourth tank (optional).





CROSS SECTION OF TANK



- 1. Anti-Splash Cover
- 2. Constant Level Tank
- 3. Tank Assembly
- 4. Tank Assembly (Front)
- 5. Switch
- 6. Frame
- 7. Reduction Unit
- 8. Drip Pan
- 9. Motor
- 10. Stopper Rod
- 11. Seal Hose Assembly
- 12. Nipple



- 13. Swivel Coupling
- 14. Midfeather
- 15. Baffle
- 16. Agitator
- 17. Screen Plate Assembly
- 18. Nipple
- 19. Coupling
- 20. Angle Connector
- 21. Flex Conduit
- 22. Straight Connector
- 23. Tubing

FIG. 1 BAUER-MCNETT CLASSIFIER

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2.3 Water Supply — A suitable filtering device shall be provided on the water supply to ensure a constant flow of clean water to the classifier and rinsing hose.

3. SAMPLING

3.1 Sampling shall be done in accordance with IS : 4844 - 1968*.

4. PROCEDURE

4.1 Sample Mass, Screen Sizes and Test Duration — Mass of sample, screen size and duration of test shall be as follows:

Fibre Group	Screen Sizes IS Sieve Designation	Sample Mass (g)	Duration of Test (Min)
a) 3, 4, 5, 6 & 7 D	4.75 mm, 1.18 mm, 425 micron, 75 micron	10	20
b) Other 7 group fibres	1.18 mm, 425 micron, 150 micron, 75 micron	20	20
c) Floats	180 micron, 45 micron	20	30

Nore 1 — The fibre group classification is based on Quebec Standard (Q.S.) designation of chrysotile asbestos grades.

Note 2 — The IS Sieve Designations 4.75 mm, 1.18 mm, 425μ m, 180μ m, 150μ m, 75μ m, and 45μ m, are identical with ASTM Standard sieves; equivalent Tyler series sieves (mesh per inch) are 4, 14, 35, 80, 100, 200 and 325 respectively, and equivalent U.S.A. (Alternative Designation) series sieves are 4, 16, 40, 80, 100, 200 and 325 respectively.

4.2 Test Procedure

4.2.1 Select screens specified for the fibre grade being tested and set in place making certain that the baffle plates are in their slots behind the screen.

4.2.2 Insert the rubber stoppers, and fill the tanks with water.

4.2.3 Start the agitators to rotate at 540 \pm 40 rpm and adjust the water valve to give a flow slightly in excess of 11.4 l/s. This rate of flow is achieved when the overflow from the constant head tank is pencil size.

4.2.4 Add the test sample to 800 ml of water in a 1 000-ml beaker and stir until the asbestos is thoroughly dispersed.

4.2.5 Pour the slurry into the first tank (tank with the coarsest screen mesh) and wash out any fibre residue in the beaker with clean, filtered water. Set the timer for 20 or 30 minutes, depending upon the sample under test.

^{*}Method of sampling and preparation of asbestos fibre for laboratory test purposes.

4.2.6 During the operation, centre the filter papers, previously weighed to the nearest 0.01 g at room conditions, in suction cups on the supporting screen. Mark the mass of the filter paper, sample designation, classifier screen mesh, and other pertinent data around the outside edge of each filter paper with a soft black pencil before inserting into the suction cup, placing the writing against the supporting screen. Wet the filter paper and clamp into position.

4.2.7 Close the main vacuum valve and open each vacuum cup valve.

Note — It is advantageous to perform the two steps as per 4.2.6 and 4.2.7 during the time in which the classifier tanks are initially being filled.

4.2.8 Watch screens carefully during the test, and if any tank appears to overflow, clean the screen surface with the soft rubber scraper.

4.2.9 At the end of the test period, stop the impellers, shut the water and open the main vacuum valve until a vacuum of approximately 10 cm water gauge is attained. Remove the drain plugs from each tank, and progressively increase the vacuum to the maximum desired. Failure to perform this operation slowly or to remove all the drain plugs before any one tank is completely drained, may cause rupture of the filter papers.

4.2.10 During draining, remove the screens and place them in their respective tanks. Immediately after a tank has been completely drained, carefully wash the screen and tank using the rinsing hose to ensure that all remaining fibre, including entrapped fibre and particles deposited behind the screen, are washed into the vacuum cup.

4.2.11 When all the fibre in a tank is deposited into the cup, and the cup itself has drained, close the drain. Failure to close the cup drain after washing down and emptying the tank causes atmospheric air to enter the vacuum system and substantially lowers the vacuum of the system.

4.2.12 After closing the cup valve, open the cup and remove the filter paper with its classifier sample fraction, and dry to constant mass at 105 to 110°C in a drying oven.

4.2.13 When all the fractions are dried and allowed to return to room conditions, weigh each paper and fraction together.

5. REPORTING OF RESULTS

5.1 Obtain the net mass of the samples fraction by subtracting the initial mass of the filter paper and record as a percentage. The quantity passing 75 micron (or 45 micron) in the original sample is calculated by subtracting the cumulative mass of the fractions retained on the filter papers from the original mass of the sample. Report the percentage of fibre retained on

each screen size and the percentage passing through the last screen. Fully identify the origin and description of the sample.

Note - For a typical calculation, Appendix A may be referred to.

5.2 If the corresponding individual percentages obtained for each screen fraction of the duplicate specimens differ by more than five units of percentage, make a third test. Average the results of two acceptable tests and report average.

6. PRECAUTIONS

6.1 To obtain desired accuracy, the general precautions given in 6.2 to 6.5 should be observed.

6.2 It is important that all material be washed from the tanks into the vacuum cups and that the filter papers are handled with care.

6.3 For better accuracy and reproducibility a water temperature of $27 \pm 2^{\circ}$ C is recommended.

6.4 New screens should be run-in at least 8 h to condition them before they are put into regular use.

6.5 When the classifier is not in use, tanks should be kept full of water to prevent deposits from forming on screens.

6.6 To obtain prescribed accuracy, screens should not be cleaned during a classification, unless tanks tend to overflow. Test results may not be reproducible when screens are cleaned frequently and at irregular intervals during the test.

APPENDIX A

(Clause 5.1)

TYPICAL CALCULATION

A-1. TEST RESULTS

Sample: Group 5 (Q.S. classification),Mass of sample: 10 gDuration of test : 20 minutesResults:IS Sieve size4.75 mmMass retained, g0.51.31.91.4

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A-2. CALCULATION

Mass of fractions passing 75 micron sieve = 10 - (0.5 + 1.3 + 1.9 + 1.4) = 4.9 g Percentage retained: IS Sieve size 4.75 mm 1.18 mm 425 micron 75 micron Percentage retained, cumulative 5.0 13.0 19.0 14.0Percentage passing 75 micron cumulative - - 49.0 (Continued from page 2)

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