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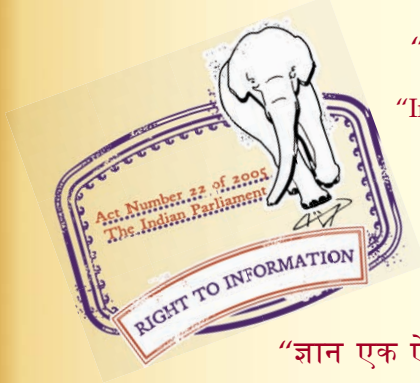
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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

**METHODS OF SAMPLING OF
ASBESTOS CEMENT PRODUCTS**

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

Indian Standard

METHODS OF SAMPLING OF ASBESTOS CEMENT PRODUCTS

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(Continued on page 2)

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Indian Standard

METHODS OF SAMPLING OF ASBESTOS CEMENT PRODUCTS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 4 April 1975, after the draft finalized by the Building Materials and Components Sampling Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Asbestos cement products find wide application in building industry because of their lightness and ease of handling combined with adequate strength. It is, therefore, imperative that due consideration is given to the sampling procedures which would help in proper and objective evaluation of the quality of these products. This standard prepared at the instance of the Asbestos Cement Products Subcommittee, lays down the methods for sampling and inspection of asbestos cement products as duly evolved on the basis of statistical principles and practical considerations.

0.3 With a view to giving due weightage to international co-ordination, this standard has been prepared in line with the ISO Recommendation, ISO/R 390-1964 'Sampling and inspection of asbestos cement products' issued by the International Organization for Standardization.

0.4 This standard is a necessary adjunct to the following Indian Standards on asbestos cement products:

- IS : 459-1970 Specification for unreinforced corrugated and semi-corrugated asbestos cement sheets (*second revision*)
- IS : 1592-1970 Specification for asbestos cement pressure pipes (*first revision*)
- IS : 1626-1960 Specification for asbestos cement building pipes, gutters and fittings (spigot and socket type)
- IS : 2096-1966 Specification for asbestos cement flat sheets
- IS : 2098-1964 Specification for asbestos cement building boards
- IS : 5913-1970 Methods of test for asbestos cement products

0.5 In reporting the results of tests and inspection, if the final value, observed or calculated, has to be rounded off, it shall be done in accordance with IS : 2-1960*.

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard prescribes the methods for sampling and criteria for ascertaining the conformity of asbestos cement products to the relevant specification.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Item — Ultimate unit of product or material on which inspection will be performed.

2.2 Defective (or Non-Conforming) — The 'Item', the quality of which does not meet the specified requirements.

2.3 Sampling Inspection — Inspection in which only a portion of a lot is inspected with a view to making decisions about accepting or rejecting the lot with respect to certain characteristics.

2.4 Lot — A collection of items from which a sample is drawn and inspected to determine its acceptability (or otherwise).

NOTE — A lot should consist of items of single type, grade, class, size, etc, produced under relatively uniform conditions of manufacture. Whereas it is not possible to give exact instructions for the formation of lots that will cover all cases, one or more of the following considerations may be helpful in determining the uniformity of the conditions of production:

- a) Items from a single batch of raw-material;
- b) Items manufactured within a relatively short period (for example a single production shift);
- c) Items manufactured by means of similar moulds (or patterns); and
- d) Items produced under similar conditions of manufacture, for example hardening and maturing, etc.

By selection of homogeneous lots the system of sampling inspection employed will lead to a better discrimination between lots of good quality and lots of bad quality.

2.5 Sample — Group of items drawn from a lot for inspection.

2.6 Inspection by Attributes — Inspection in which an item is classified as either defective or non-defective.

2.7 Inspection by Variables — Inspection in which quality characteristics of an item are measured on a continuous scale and expressed in terms of units of measurement.

2.8 Double Sampling Plan — A type of sampling inspection in which the inspection of the first sample leads to a decision to accept a lot, to reject it or to take a second sample and the inspection of the second sample when required, always leads to a decision to accept or reject the lot.

2.9 Range— The difference between the largest and the smallest observations or test results in a sample.

2.10 Mean— The sum of the observations divided by the number of observations.

3. SAMPLING

3.1 From each lot a sample shall be drawn, the size of which is indicated in Table 1.

3.2 Columns 1 to 4 and col 7 of Table 1 give the number of items of product in the lot and the sample to be selected for inspection by attributes and by variables.

3.3 From one item of a sample one test piece only shall be cut for a particular test, but for different tests the necessary test pieces may be cut from the same item of the sample. When the relevant specification calls for more than one property to be tested, the sample size may have to be appropriately multiplied so as to secure for each test a number of test pieces equal to the sample size (**3.2**). Method and position of cutting the specimen shall be as given in the relevant specification.

4. INSPECTION

4.1 Each item in the sample shall be tested as specified in the relevant specification.

4.2 The test results shall be evaluated either through the method of inspection by attributes (**4.4** and **5.1**) or through the method of inspection by variables (**4.5** and **5.2**).

4.3 The method of inspection by variables shall normally be employed for (a) transverse strength (b) water absorption and (c) density; and for all other characteristics the method of inspection by attributes shall be used. However, by agreement prior to the drawing of the samples (**3.1**), the method of inspection by variables or attributes may be substituted for each other for any characteristic.

4.4 When the method of inspection by attributes is employed, the number of defective items in the sample should be deduced from the test results and the acceptability of the inspection lot determined as prescribed in **5.1**.

4.5 When the method of inspection by variables is employed, the test results shall be recorded individually retaining the order in which they are obtained and the acceptability of the inspection lot determined as prescribed in **5.2**.

TABLE 1 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

(Clauses 3.1, 3.2, 5.1.1, 5.1.2, 5.1.3, 5.1.6 and 5.1.7)

NUMBER OF ITEMS IN THE LOT	INSPECTION BY ATTRIBUTES					INSPECTION BY VARIABLES	
	Sample	Sample Size	Cumu- lative Sample Size	Accept- ance Number	Rejec- tion Number	Sample Size	Acceptability Criterion
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Up to 100	1st	3	3	0	2	3	0.29
	2nd	3	6	1	2		
101 „ 200	1st	4	4	0	2	4	0.34
	2nd	4	8	1	2		
201 „ 400	1st	5	5	0	2	5	0.37
	2nd	5	10	1	2		
401 „ 800	1st	7	7	0	2	7	0.40
	2nd	7	14	1	2		
801 „ 1 500	1st	10	10	0	2	10	0.50
	2nd	10	20	2	3		
1 501 „ 3 000	1st	15	15	0	3	15	0.51
	2nd	15	30	3	4		
3 001 „ 8 000	1st	25	25	1	4	25	0.52
	2nd	25	50	5	6		
8 001 „ 20 000	1st	35	35	2	5	35	0.53
	2nd	35	70	7	8		

5. DETERMINATION OF ACCEPTABILITY OF INSPECTION LOTS

5.1 Inspection by Attributes

5.1.1 When the number of defective items found in the first sample is equal to or less than the acceptance number a indicated in col 5 of Table 1, the inspection lot from which the sample was drawn shall be considered acceptable.

5.1.2 When the number of defective items found in the sample is equal to or greater than the rejection number r indicated in col 6 of Table 1, this may justify rejection of the inspection lot.

5.1.3 When the number of defective items found in the first sample lies between the acceptance number and the rejection number (col 5 and 6 of Table 1), a second sample of the same size as the first sample (col 3 of Table 1) shall be drawn and inspected.

5.1.4 The second sample shall also be inspected as indicated in 3.3 and 4.4.

5.1.5 The number of defective items found in the first and in the second samples shall be combined.

5.1.6 If the combined number of defective items is equal to or less than the corresponding acceptance number a (col 5 of Table 1), the inspection lot shall be considered acceptable.

5.1.7 If the combined number of defective items is equal to or greater than the corresponding rejection number r (col 6 of Table 1), this may justify rejection of the inspection lot.

5.1.8 When the relevant specification calls for more than one property to be tested, the second sample taken (5.1.3) shall only be inspected in accordance with those characteristics which at the inspection of the first sample gave defective items between the acceptance number a and the rejection number r .

5.2 Inspection by Variables

5.2.1 Divide the readings in the order made into groups of 5, except when the sample size is 3, 4, 5 or 7, in which cases the group size is the same as the sample size.

5.2.2 For each group compute the range R .

5.2.3 From the group ranges R , compute the average range \bar{R} .

5.2.4 Compute the sample mean \bar{X} by dividing the sum of measurements by the sample size.

5.2.5 Derive from Table 1 (col 8) the acceptability criterion K .

5.2.6 Compute the acceptability limit AL and determine the acceptability by means of following table:

<i>Relevant Recommendations Prescribing</i>	$AL =$	<i>Acceptable if</i>	<i>Rejection Justified if</i>
Lower specified limit, L	$L + KR$ (or \bar{R})	$\bar{X} \geq AL$	$\bar{X} < AL$
Upper specified limit, U	$U - KR$ (or \bar{R})	$\bar{X} \leq AL$	$\bar{X} > AL$

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