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METHODS FOR SAMPLING OF RUBBER
AND RUBBER COMBINATION FOOTWEAR

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

METHODS FOR SAMPLING OF RUBBER AND RUBBER COMBINATION FOOTWEAR

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Indian Standard
**METHODS FOR SAMPLING OF RUBBER
AND RUBBER COMBINATION FOOTWEAR**

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 November 1971, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

0.2 In the supply of footwear produced to a relevant specification, an important problem that usually arises is to check the quality of the material supplied and to determine its acceptability or otherwise. For checking the quality on the basis of sampling inspection, a suitable procedure has to be prescribed for drawing the representative samples of footwear items and properly interpreting the results of inspection. This standard lays down the methods for sampling as also the criteria for ascertaining the conformity of a supply to the relevant specification.

0.3 The sampling procedure as laid down in this standard is specifically intended for the inspection of finished footwear. However, for controlling the quality of footwear at various stages of production, use of statistical quality control methods is recommended (*see* IS : 397-1952*).

1. SCOPE

1.1 This standard prescribes the methods of sampling and criteria for conformity for rubber footwear whose upper may be wholly or partly made of rubber or canvas and sole made of rubber.

1.2 In the case of material specifications for the components of rubber footwear, the sampling schemes given in those specifications shall hold good.

2. TERMINOLOGY

2.0 For the purpose of this standard, the definitions given in IS : 2050-1967† and the following shall apply.

*Method for statistical quality control during production by the use of control chart (*tentative*).

†Glossary of footwear terms.

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2.1 Lot — A collection of rubber footwear in a consignment belonging to the same pattern or batch of manufacture. In case the batch size is small, footwear of the same size and pattern manufactured during a period not exceeding a fortnight may be grouped together to form a lot.

2.2 Tender Sample — The pairs of footwear of any particular size, fitting and pattern submitted by the supplier with his tender.

2.3 Approved Sample — The pairs of footwear of any particular size, fitting and pattern chosen from the tender samples by the purchaser as the basis of supply; when a sample is tested and approved by the purchaser the results of such tests that would help the supplier in meeting the specification for delivery shall be made available to the supplier on request.

2.4 Defect — A failure or fault of a footwear to meet the requirements of a specification and approved sample, if any, with regard to any quality characteristic including physical, chemical and performance properties, also an irregularity in material, workmanship or damage due to careless and inadequate packing.

2.5 Defective Footwear — A footwear having one or more defects mentioned above.

2.6 Acceptable Quality Level (AQL) — The maximum percent defective that, for the purpose of sampling of rubber footwear, can be considered as satisfactory process average for a given characteristic.

NOTE — For every sampling plan there is an associated AQL value and this value is given as a percent defective items in a lot which, under the plan, will be accepted by the purchaser most of the times.

3. SCALE OF SAMPLING

3.1 Samples shall be selected and examined for each lot for ascertaining the conformity of the footwear to the requirements of given specification.

3.2 For the purpose of formation of lots, footwear shall be considered to be of different patterns, if they differ in any of the ways enumerated below:

- a) Type of rubber;
- b) Fabric used in the upper, binding, stiffening and bottom material;
- c) Type and material of which heel, sole and toe cap and other reinforcements are made; and
- d) Shape and design.

3.3 The number of footwear pairs to be selected from any lot shall depend on the size of the lot and shall be in accordance with col 1 and 2 of Table 1.

TABLE 1 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVES

(Clauses 3.3, and 5.2)

| No. of Footwear Pairs in the Lot | SAMPLE SIZE | PERMISSIBLE No. of DEFEC- TIVE PAIRS FOR MAJOR DEFECTS | | PERMISSIBLE No. OF DEFECTIVE PAIRS FOR MINOR (5.1.2) AND DIMENSIONAL DEFECTS (5.2) | |
|---|-------------|---|--------------------------------|--|--------------------------------|
| | | Safety Footwear | General Purpose Footwear | Safety Footwear | General Purpose Footwear |
| (N) | (n) | (3) | (4) | (5) | (6)† |
| Up to 50 | 13 | 0 | 0 | 0 | 1 |
| 51 „ 100 | 20 | 0 | 1 | 1 | 1 |
| 101 „ 300 | 32 | 0 | 1 | 1 | 2 |
| 301 „ 500 | 50 | 1 | 2 | 2 | 3 |
| 501 „ 1 000 | 80 | 1 | 3 | 3 | 5 |
| 1 001 „ 3 000 | 125 | 2 | 5 | 5 | 7 |
| 3 001 and above | 200 | 3 | 7 | 7 | 10 |

NOTE — The AQL values for the sampling plans corresponding to the permissible number of defectives given in col 3, 4, 5 and 6 are 0.65, 1.5, 1.5 and 2.5, respectively.

4. METHODS OF SELECTING RUBBER FOOTWEAR

4.1 Footwear to be selected from the lot shall be chosen at random. In order to ensure the randomness of selection a random number table may be used. For guidance to the use of random number table, IS : 4905-1968* may be referred.

4.2 In the absence of a random number table, the footwear pairs may be selected from the lot in the following manner:

Starting from any footwear pair in the lot, the pairs shall be counted as 1, 2, 3, etc, up to r and so on, in one order. Every r th pair thus counted shall be withdrawn to constitute the sample where r is the integral part of N/n (N and n being the lot size and sample size respectively.)

4.3 When the footwear pairs in the lot are packed in a number of cases, the sample cases to be selected at random shall be as given in Table 2. From each of the sample boxes, approximately equal number of footwear pairs shall be selected at random to give the required sample size prescribed in Table 1.

*Methods for random sampling.

TABLE 2 NUMBER OF CASES TO BE INCLUDED IN THE SAMPLE

(Clause 4.3)

| LOT SIZE (No. OF CASES) | SAMPLE SIZE |
|------------------------------|-------------|
| (1) | (2) |
| Up to 3 | All |
| 4 „ 10 | 4 |
| 11 „ 20 | 5 |
| 21 „ 30 | 8 |
| 31 „ 40 | 11 |
| 41 „ 60 | 15 |
| 61 „ 80 | 21 |
| 81 „ 100 | 27 |
| 101 and above | 30 |

5. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

5.1 Visual and Tactile Examination

5.1.0 The lot shall be first subjected to detailed visual and tactile examination. The defects usually observed on such examination have been broadly divided into two classes, namely, major defects and minor defects, in order to facilitate sampling inspection. The list of defects as classified in Appendix A is not exhaustive but covers those which are commonly met with during inspection.

5.1.1 Inspection for Major Defects — The sample size for this examination is given in col 2 of Table 1. All the selected footwear pairs shall be examined for major defects (see Appendix A). A defective footwear under this clause shall be one which contains one or more of major defects and it may or may not show minor defects. A pair is termed defective if one or both of the constituent footwear are defective. The number of defective footwear pairs shall not exceed the permissible number given in col 3 of Table 1 in the case of safety footwear and col 4 of Table 1 in the case of general purpose footwear if the lot is to be accepted under this clause.

5.1.2 Inspection for Minor Defects — The lot which passes the test under 5.1.1 shall be subjected to scrutiny for minor defects. The sample size is the same as in 5.1.1. These sample pairs may be drawn from among those found satisfactory under 5.1.1 along with the required number of fresh pairs to give the prescribed sample size. Under this clause a defective footwear may contain one or more of minor defects but shall not show any major defect. The number of defective pairs found on this examination shall not exceed the permissible number given in col 5 or col 6 of Table 1 as the case may be.

5.2 The lot which passes the visual examination under 5.1 shall be examined for dimensional requirements and weight (wherever applicable). The sample size is given in col 2 of Table 1. The number of defective pairs shall not exceed the permissible number prescribed in col 5 (for safety footwear) or col 6 (ordinary footwear) of Table 1 if the lot is to be declared satisfactory.

5.3 Physical and Destructive Tests

5.3.1 The tests included under this clause cover those which are applicable to general purpose footwear as well as safety footwear. The sample size for different tests is given in Table 3. The selected pairs shall be tested for those characteristics, the requirements for which are prescribed in relevant specifications.

TABLE 3 SCALE OF SAMPLING FOR PHYSICAL AND DESTRUCTIVE TESTS

| Lot Size (N) | Sample Size (n) | | |
|-----------------|---|---|--|
| | Colour Fastness and Water- proofness Tests | Physical Tests for Rubber Components and Test for Upper Material | Impact, Leakage, Electrical Resistance Tests and Other Special Tests (for Safety Footwear) |
| (1) | (2) | (3) | (4) |
| Up to 100 | 1 | 1 | 2 |
| 101 „ 300 | 2 | 1 | 3 |
| 301 „ 500 | 2 | 2 | 4 |
| 501 „ 1 000 | 3 | 2 | 5 |
| 1 001 and above | 3 | 3 | 7 |

5.3.2 The footwear pairs for the above tests shall be selected from among those pairs which have passed visual and dimensional examination under 5.1 and 5.2. The lot shall be declared as satisfactory if all the selected pairs pass the prescribed tests.

APPENDIX A
(*Clauses 5.1.0 and 5.1.1*)

**THE LIST OF DEFECTS COMMONLY OBSERVED DURING
VISUAL INSPECTION OF FINISHED FOOTWEAR**

Major Defects

1. Difference in shape, design and colour
2. Incorrect size/wrong size packing/odd pairing
3. Distortion of shape
4. Faulty jointing and adhesion of sole, heel, golosh, toe cap and insole
5. Insole cut short
6. Undergauge or overgauge components
7. Broken stitches and incorrect number of stitches
8. Foxing not covering sole and upper
9. Excessive pitting or air pocket or bulging of the sole and heel or any other rubber component
10. The toe reinforcement omitted or not cemented properly to the vamp
11. Missing or defective eyelets or eyeletting, buckles and buckle stitching
12. Crooked imitation stitches

Minor Defects

1. Stains and dirt in lining and insole
2. Stiffeners not centrally placed
3. Slight variation in positioning of eyelets
4. Illegible marking on the insole
5. Overlapping of the foxing on the sole
6. Slight variation in height of quarter and leg
7. Substandard lace