**Preliminary draft**

**All Rubber / Polymer Gum Boots and Ankle Boots for Children - IS 5557 Part 3**

**FOREWORD**

This Indian Standard was prepared by the Bureau of Indian Standards, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

There is no Indian standard available in the country for gum boot and ankle boot for the children, keeping in mind also there are quite a number of the state governments procuring for their school children and also domestic requirement. It is a very much essential to develop the standard for the country to get quality and durable gum boot and ankle boot to be used in school students community and domestic consumers for children.

Realizing the need of standard of gum boot and ankle boot in the country, the Footwear Sectional Committee decided to develop the standard in line with the recent technological developments a that have taken place in developing this standard and also the standard was prescribed constructional and functional performance requirements of school shoes, domestic consumer children community and more importantly committee incorporated the wearer of this boot shall protect hazardous chemicals while manufacturing the shoe and also prevent environmental impact were also taking care while developing this these boots standard.

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 or analysis shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (second revision)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**1.0 Scope**

This standard prescribes requirements, methods of sampling and tests for all rubber /polymer gum boots and ankle boot for children.

**2.0 References**

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revisions, and parties to agreement based on this Indian Standard are encouraged to investigate the possibility of applying the most recent editions of the Indian Standards indicated in **Annex A**.

**3.0 Terminology**

For the purpose of this standard, the definitions given below along with definitions of terms, symbols, and units given in IS 2050 shall apply.

**4.0 Sampling and conditioning**

Wherever, possible test pieces shall be taken from the whole footwear unless otherwise stated.

If it is not possible to obtain test pieces from footwear large enough to comply with tests requirements, then samples may be taken from the raw material from which the component has been manufactured. However, this should be reported in the test report.

All test shall be conditioned at 27±2oC and 65±5% Relative Humidity (RH)

**5.0 Classification**

This standard covers the following two types of gum boots and ankle boots:

a) Type 1: All rubber gum boots and ankle boot.

b) Type 2: All polymer gum boot and ankle boot.

**6.0 REQUIREMENTS**

**Design**

The boots shall be made of rubber/polymer with fabric lining as shown in Fig. 1 for type 1 Fig. 2 and Fig. 3 for Type 2 respectively ( as given in IS 5557:2018 for reference only). The sole and heel shall be of made of rubber or polymer and anti -slip design to prevent slip or as agreed to between the purchaser and the supplier. Design shown in the drawings are recommendatory only.

**6. Size and fittings**

The recommended size and fittings of gum boot and ankle children Boys and Girls is given below and will be guided in accordance with IS 1638

|  |  |  |  |
| --- | --- | --- | --- |
| **CATEGORY** | **GROUPS** | **AGE** | **SIZE** |
| Category 1 | Kids Group | 4- 8 years | 9,10,11 |
| Category 2 | Children Group | 8-11 years | 12, 13, 1 |
| Category 3 | Boys and Girls Group | 11 – 12 years | 2,3,4,5 |
| Category 4 | Youth Group | Above 13 years | 6,7,8,9 |

**7. Construction**

The footwear shall be manufactured by injection/ casting/compression and conventional assembly, as suitable through the process of vulcanization of rubber and can be with or without lining. The footwear manufactured in conventional assembly from single texture rubberized fabric and vulcanized, is an unlined footwear. The edges of the upper and tongue may be binded with coated binding material.

The sole attachment may be made direct moulding /vulcanization process. The outsole may be use single or multilayer sole.

**8.0 Material**

Material used in the gum boot and ankle boost shall be made as given under

|  |  |  |
| --- | --- | --- |
| S. No | Components of the Gum boot and ankle boot | Material |
| 1 | Leg  Inner  outer | Fabric (Natural/ synthetic)  Rubber/ Polymer |
| 2 | Vamp  Inner  outer | Fabric (Natural/Synthetic)  Rubber/Polymer |
| 3 | Counter | Rubber/polymer |
| 4 | Inner reinforcement at vamp | Rubberized fabric |
| 5 | Heel | Rubber/Polymer |
| 6 | Outer toe cap | Rubber/Polymer |
| 7 | Foxing strip | Rubber/Polymer |
| 8 | Top Binding | Rubber/Polymer |
| 9 | Insole  Inner  outer | Rubber/polymer  Fabric (Natural /Synthetic) |
| 10 | Full Below Tongue | Single texture rubberized/Polymerized fabric |

**Upper requirement shall conform as given in the Table 1**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Properties** | **Requirement** | **Test Methods** |
| 1 | Thickness, mm  Rubber  Polymer | Min 1.5  Min 1.0 | IS 15298 Part 1  Clause 6.1 |
| 2 | Rubber  Breaking Force, N  Polymer  Tensile strength, N/mm2  (Modulus at 100 % Elongation) | Min 180  1.4 - 4.6 | IS 15298 Part 1  Clause 6.4 |
| 3 | Elongation at Break, %  Polymer | Min 250 |
| 4 | Flexing Resistance  Rubber  Polymer | No crack at 125000  No crack at 150000 | IS 15298 Part 1  Clause 6.5 |
| 2 | Abrasion resistance,  (Conducted on fabric surface inner side of the upper)  Dry 25,600 cycles  Wet 12,800 cycles | No hole formed  No hole formed | IS 15298 Part 1  Clause 6.4 |

**Sole requirement shall confirm as given in Table 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Properties** | **Requirement** | | **Test Methods** |
| 1 | Thickness, mm  Fore part  With cleat  Cleat Height, mm | Fore part | Heel | IS 15298 Part 1  Clause 8.1. |
| Min 10.0  Min 6.0  Min 2.5 | Min 15.0  Min 9.0  Min 2.5 |
| 2 | Tear strength, N/mm | Min 5 | | IS 15298 Part 1  Clause 8.2 |
| 3 | Abrasion resistance, mm3 Volume loss | Max 250 | | IS 15298 Part 1  Clause 8.3 |
| 4 | Flexing resistance, mm  ( Cut growth at 30,000 flexes) | Max 4.0 | | IS 15298 Part 1  Clause 8.4 |
| 5 | Bond strength, N/mm | Min 4.0  Or  Min 3.0  Material tear | | IS 15298 Part 1  Clause 5.2 / ISO 4649:2017 |

**Physical requirement of rubber components as given in the Table 3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Properties** | **Requirement** | | **Test Methods** |
| **Body** | **Sole** |
| 1 | Hardness, IRHD | 50± 5 | 60± 5 | IS 3400 ( Part 2) |
| 2 | Change in hardness after accelerating ageing 1000C±2 for 24 hours | +5  -2 | +5  -2 | IS 3400 (Part 2) |

**Insole requirement shall confirm as given in Table 4**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Properties** | **Requirement** | **Test Methods** |
| 1 | Thickness, mm | Min 2.0 | IS 15298 Part 1  Clause 7.1 |
| 2 | Abrasion resistance,  (Conducted on fabric surface of insole)  Dry 25,600 cycles  Wet 12,800 cycles | No hole formed  No hole formed | IS 15298 Part 1  Clause 6.12 |

**9.0 Test on complete footwear**

**9.1 Height of Upper**

The boots shall conform to design B, C, D, or E given in Fig. 3 in IS 15298 (Part 4) and the height of upper, when tested in accordance with 6.2 of IS 15298 (Part 1), shall conform to requirements prescribed in 5.2.2 of IS 15298 (Part 4)

**9.2 Leak Proof Test**

When the whole footwear is tested in accordance with 5.7 of IS 15298 (Part 1), there shall not be any leakage of air.

**9.3 Adhesion Test for Rubberized Textile Upper**

Representative samples of width 25 ± 5 mm are cut out from the whole footwear along the length of the boot. The rubber and fabric plies are separated by breaking the bond. Test on 2 specimens are carried out in accordance with IS 3400 (Part 5). There shall be no separation at a load of 1.5 kg.

**9.4 Chemical test**

All the components of gum boot and ankle boot which are in direct contact of with foot shall comply with Table 1 of IS 17011 for critical substances **Category I and Category II as specified under 3.6 of IS 17011.**

**9.5, Lead content(pb):**

The gum boot and ankle boot lead content shall be maximum of 2.0 ppm when tested in accordance with IS 12240 (part 5). Lead content is applicable only PVC polymer if used.

**10.0 Marking and Packing**

**10.1 Marking**

The shoes shall be marked legibly with the following:

a) Size;

b) Type;

c) Identification of the source of manufacturer or brand name;

**10.2 BIS Certification Marking**

The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations made thereunder.

The details of the conditions under which the license for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Packing The shoes shall be packed as agreed to between the purchaser and the manufacturer. Each individual package shall contain shoes of one size only and may be marked with the name of the item, size, colour, and type, best before date, identification of the source of manufacture and batch number and any other marking if so desired.

**Annex ‘A’-LIST OF REFERRED INDIAN STANDARDS**

|  |  |
| --- | --- |
| ***IS No.*** | ***Title*** |
| IS 15298 (Part 1): 2015 | Personal Protective Equipment Part 1 Test Methods for Footwear (*second revision*) |
| IS 15298 (Part 4): 2017 | Personal Protective Equipment Part 4 Occupational Footwear (*second revision*) |
| IS 17011: 2018 | Chemical requirements for footwear and footwear materials |
| IS 3400 (Part 3): 2021/ISO 4649:2016  ISO 4649: 2017 | Methods of Test for Vulcanized Rubbers Part 3 Abrasion Resistance using a Rotating Cylindrical Drum Device (Third Revision)  Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device |
| IS 5557: 2018 | All rubber gum boots and ankle boots- Part 2 occupational purposes |
| IS 1638:1969 | Sizes and fitting of the footwear |
| IS 2050: 1991 | Glossary of terms related to footwear |
| IS 3400: 2014: Part 2 | Methods of test for vulcanized rubber: (Part 2): 2014 Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD |
| IS 3400: 2012: Part 4 | Accelerated ageing and heat resistance (first revision) |
| IS 3400: 2012: Part 5 | Adhesion of rubbers to textile fabrics (second revision) |
| IS 12240: Part 5:1988 | Method of test for Polyvinyl chloride Boots. Determination of Lead content |