मानकः पथप्रदर्शकः
Bureau of Indian Standards

COMPENDIUM OF INDIAN STANDARDS ON

SAFETY FOOTWEAR

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INTRODUCTION

Safety footwear is an essential component of personal protective equipment (PPE) in various industries, ensuring the safety and well-being of workers. These standards play a crucial role in safeguarding workers against workplace hazards such as impact, compression, chemical exposure, and electrical risks.

The standards for safety footwear aligns with international best practices and aims to enhance workplace safety across industries such as construction, manufacturing, mining, and chemical processing.

Properly designed safety footwear not only mitigates physical and environmental risks but also enhances comfort, reduces fatigue, and promotes overall worker well-being. Adhering to these standards ensures protection from falling objects, punctures, cutting hazards, electrical risks, and slips, while providing necessary foot support to minimize fatigue, and ensuring compliance with safety regulations, contributing to a safer and more efficient work environment.

This compendium aims to provide an overview of Indian Standards related to safety footwear, test methods of Safety Footwear and Code of Practice for manufacturing of Safety Footwear outlining the key requirements and classifications that ensure the footwear is safe, durable, and fit for purpose.

By compiling relevant standards on safety footwear into a single document, this compendium serves as a ready reference for manufacturers, testing agencies, and regulatory bodies involved in manufacturing or evaluating footwear that meets safety and quality benchmarks.

INDIAN STANDARDS ON SAFETY FOOTWEAR

1. IS 15298 (Part 2): 2024 Personal Protective Equipment: Safety Footwear

This standard outlines the basic and additional (optional) requirements for safety footwear used for general purpose. It is designed to ensure that footwear provides adequate protection against various hazards such as mechanical injuries, slips, thermal risks, and ergonomic strain.

Key Provisions:

Performance and Chemical Requirements: The standard includes detailed requirements for both the whole footwear and its individual components. This includes toe protection, leakproof performance, slip resistance, tensile strength, water vapour permeability, abrasion resistance, and flexing endurance and Chemical Requirements. Depending on the intended use, safety footwear may also be equipped with additional protective features. These include electrical properties (antistatic or insulating), metatarsal protection to shield the upper foot, ankle protection for stability and injury prevention, cut resistance, resistance to hot surface contact, resistance to fuel oils, and ladder grip features.

2. IS 15298 (Part 3): 2024 Personal Protective Equipment: Protective Footwear

This standard outlines basic and additional (optional) requirements for protective footwear used for general purpose. It specifies requirements for protective footwear equipped with customized insocks, customized protective footwear or individual manufactured customized protective footwear. This standard does not cover the property of high visibility because of interaction with the clothing and work area conditions

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Key Provisions:

- Protective footwear is classified based on the materials used in its construction. There are three categories: Class I includes footwear made from leather and other non-polymeric materials; Class II all-rubber or all-polymeric footwear, and Hybrid footwear.
- Specifies basic and optional requirements for general-purpose protective footwear. Basic requirements include impact and compression resistance, slip resistance, innocuous materials, ergonomic compliance, and durability.
- Additional requirements include perforation resistance, conductive/antistatic properties, water resistance, and protection for metatarsal, ankle, scuff, and cut.

3. IS 15298 (Part 4): 2024 Personal Protective Equipment: Occupational Footwear

This standard specifies basic and additional (optional) requirements for occupational footwear used for general purpose. It includes, mechanical risks, slip resistance, thermal risks, ergonomic behavior. This Footwear incorporates protective features to protect the wearer from injuries which could arise through accidents, not fitted with toecaps.

Key Provisions:

It also specifies requirements for occupational footwear equipped with customized insocks, customized occupational footwear or individual manufactured customized occupational footwear. Performance parameters are specified for both whole footwear and individual components, covering aspects such as tear strength, tensile strength, abrasion resistance, slip resistance, water vapor permeability, and other relevant tests.

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4. IS 3976: 2018 Safety Rubber Canvas Boots for Miners

The standard covers the materials, construction requirements, performance tests, and ensures safety, durability, and comfort of the footwear. Safety rubber canvas boots for miners are used by workers engaged in underground mining of coal, mica, silica, clay, stone and other minerals and also in other mining operations.

Key Provisions:

Type:

Two types of safety footwear specified in the standard for the protection of miners are:

a) Type 1 boots are preferred for conditions where there is water accumulation or slurry in mining.

b) Type 2 boots are preferred for use in dry mining conditions.

Requirements:

The boots shall pass various tests, including impact resistance, bond strength, energy absorption, abrasion, resistance to hot contact, hydrolysis, and tear strength. They shall also pass tests for specified chemical requirements.

5. IS 12254:2021 Polyvinylchloride (PVC) Industrial Boots

This standard prescribes requirements, methods of sampling and test for safety, protective and occupational PVC footwear for protection of workers involved in industrial work.

Key Provisions:

The boots are classified based on their design and protection level. In terms of design, Type I boots are ankle boots, while Type II boots are Wellington or gum boots. For protection levels, they are categorized into three varieties: Variety 1, for use as safety footwear; Variety 2, for use as protective footwear; and Variety 3, for use as occupational footwear.

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Standard Covers various physical requirements, including upper-outsole bond strength, slip resistance, leakproofness, and impact resistance. Toe caps must be securely fixed, corrosion-resistant, and impact-resistant. The boots also meet the additional requirements for conductive footwear, antistatic footwear, penetration resistance, cut resistance, cold flex resistance for the upper, resistance to acid and alkali for the outsole, and resistance to fuel oil.

6. IS 1989 (Part 1):1986 Specification for leather safety boots and shoes: Part 1 For miners (Reaffirmed in 2021)

This standard prescribes the requirements and methods of sampling and test for leather safety boots and shoes for men miners.

Key Provisions:

- This standard has been classified into two sections: Section 1: For Safety Boots Section 2: and Safety Shoes.
- The boots are designed in an ankle-high derby pattern with six eyelets, a padded tongue, and a reinforced steel toe cap. However, the shoes feature a derby design with up to four eyelets, a padded tongue, and full leather lining. A steel toe cap is a mandatory safety feature.
- The key components for the leather safety boots and shoes are upper leather, lining leather, bottom, steel toe cap. Additional components include cotton newar tape, bitumen felt, eyelets adhesives, threads, rivets, screw wire, shank, laces, tongue lining, etc. The Safety boots and Shoes must pass an impact test with a force of 14 kgf.m.

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7. IS 1989 (Part 2):1989 Specification for leather safety boots and shoes: Part 2 For heavy metal industries (Reaffirmed in 2021)

This standard prescribes the requirements and methods of sampling and test for leather safety boots and shoes for workers engaged in heavy metal industries.

Key Provisions:

Design Features

- Boots: Ankle-high, derby pattern with 6 eyelets, padded tongue, full vamp, and steel toe cap.
- Shoes: Derby design with up to 4 eyelets, leather lining, padded tongue, and steel toe cap.

Material Requirements

The key components for the leather safety boots and shoes are upper leather, lining leather, soles, steel toe cap. additional components include eyelets, rivets, flannel tongue lining, cotton tapes, adhesives, laces, brass screw wires, etc.

8. IS 5557 (Part 1):2024 All Rubber Gum Boots and Ankle Boots Part 1 Safety and Protective

This standard prescribes requirements, methods of sampling and tests for industrial and other professional use of rubber boots as Safety and Protective purposes including uses in wet and slurry conditions or in conditions where the wearers are exposed to chemicals, oil/grease, mining and explosion oriented conditions etc.

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Key Provisions:

- **Two types** of Safety and Protective boots are covered in the standard based on design:
  a) Type 1 — Ankle boots; and
  b) Type 2 — Wellington/Gum boots.
- **Three varieties** of industrial safety & protective rubber boots:
  a) Variety 1: Oil and Grease resistance.
  b) Variety 2: For use in fire and explosive prone areas including mining operations.
  c) Variety 3: For general use (non-oil resistance)
- The standard mandates feature such as steel or non-metallic toe caps, penetration-resistant midsoles, and insocks with abrasion resistance. Optional properties include antistatic resistance, flame resistance, electrical insulation, and acid/alkali resistance.

9. IS 5557(Part 2):2018 All Gum boot and Ankle boots (Part 2): Occupational purposes

This standard prescribes requirements, methods of sampling, and tests for rubber boots to be used by workers in wet and slurry conditions or in conditions where the workers are exposed to chemicals, oil and grease.

Key Provisions:

- **Types and Variety:** Two types of Occupational boots are covered in the standard based on design:
  a) Type 1 — Ankle boots, and
  b) Type 2 — Wellington/Gum boots.

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- This standard covers the following three varieties based on purpose:
  a) Variety 1 — for use in areas having contact with oil and grease,
  b) Variety 2 — for use in fire and explosive prone area, and
  c) Variety 3 — for use in general working conditions.
- Performance Requirements specified are Tensile strength, tear strength, abrasion resistance, and flex resistance for uppers and outsoles. Leak-proofing, hot contact resistance, and adhesion strength test for Whole footwear is specified in the standard. Optional performance features include resistance to acids, alkalis, fuel oils, as well as anti-static, conductive, cold-resistant, and electrically insulating properties, as per customer requirements.

10. IS 14544: 2022 Leather safety footwear with direct moulded polyvinyl chloride (PVC) sole

This standard prescribes requirements, methods of sampling and tests for leather safety and protective footwear having steel toe caps and with direct moulded polymeric soles for protection of users.

Key Provisions:

- **Types and Variety:** The standard classifies the footwear into two varieties — safety and protective footwear — and two typesbased on design — low shoes and ankle boots.
- Standard specifies detailed physical and chemical requirements, including parameters such as impact and compression resistance, bond strength, slip resistance, fuel oil resistance, material properties (tear and tensile strength, water vapor permeability), ergonomic features, and corrosion resistance for metallic parts. The standard also outlines additional optional requirementssuch as anti-static, conductive, cold and heat insulation properties depending on workplace hazards.

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11. IS 11226: 1993 Leather safety footwear having direct moulded rubber Sole-Specification (Reaffirmed in 2023)

This standard prescribes the requirements, methods of sampling and tests for leather safety footwear having steel toe caps and direct moulded rubber soles.

Key Provisions:

- **Types:** Leather safety footwear having Steel toe cap and direct moulded rubber soles shall be of following three types depending on their design:
  a) Type 1 Ankle Boots
  b) Type 2 Jodhpuri shoes
  c) Type 3 Derby shoes

- The Requirements of component for leather Safety Footwear having direct moulded rubber soles shall meets the specified requirements of the standard. Components of the Soles and heels must be slip-resistant, oil-resistant (if required), and meet requirements for density, hardness, tensile strength, elongation, abrasion, and ageing. Typical designs are shown, but other agreed-upon designs are allowed.

INDIAN STANDARDS ON TEST METHODS FOR SAFETY FOOTWEAR

Test methods are essential for determining the quality of safety footwear. The various components of safety footwear are subjected to different requirements specified in the standard.

- The upper of the footwear are tested for determination of thickness, height, tear strength, tensile properties, flexing resistance, and water-related properties such as water vapour permeability, absorption, and resistance to penetration. Chemical safety is evaluated by testing the pH value, resistance to hydrolysis, and checking for the presence of hazardous substances like Chromium VI.
- The lining and tongue are tested primarily for mechanical strength and durability through tear strength and abrasion resistance tests.
- Insoles and insocks, are tested for thickness, water absorption and desorption properties, abrasion resistance, and chemical parameters like pH value and Chromium VI content.
- For the outsole, key tests include dimensional checks (cleat area, thickness), tear and abrasion resistance, flexing resistance, resistance to hydrolysis (to simulate ageing), and performance under exposure to fuel oil and hot surfaces.
- The toe cap, which provides vital protection against impact and compression, undergoes specific tests to verify its internal dimensions and strength. Impact and compression resistance tests simulate real-life hazards, while additional evaluations examine the thermal and chemical behaviour of both metallic and non-metallic toe caps.

List of standards on Methods of test for Safety Footwear

S No.	IS Number	Title	Key Provisions
1	IS 8085 (Part 17)/ ISO 22774 : 2004	Methods of Test for Footwear Part 17 Abrasion resistance for accessories shoe laces	This standard specifies three test methods for determining the abrasion resistance of a shoe lace to repeated rubbing: Method 1: lace to lace abrasion; Method 2: lace to standard eyelet abrasion; Method 3: lace to eyelet (from footwear) abrasion.
2	IS 12240 (Part 2): 1988 (Reaffirmed in 2023)	Methods of test for polyvinyl chloride boots: Part 2 Determination of durometer hardness Shore A	This standard prescribes the test procedure for determination of the durometer hardness, Shore A of the components for polyvinyl chloride boots.
3	IS 12240 (Part 3): 1988 (Reaffirmed in 2023)	Methods of test for polyvinyl chloride boots: Part 3 Determination of relative density	This standard prescribes the test procedure for determination of the relative density of components for polyvinyl chloride boots.
4	IS 12240 (Part 4): 1988 (Reaffirmed in 2023)	Methods of test for polyvinyl chloride boots: Part 4 Determination of volatility	This standard prescribes the test procedure for determination of the volatility of components for polyvinyl chloride boots.
5	IS 12240 (Part 5): 1988 (Reaffirmed in 2023)	Methods of test for polyvinyl chloride boots: Part 5 Determination of lead content	This standard prescribes the test procedure for determination of the lead content of components for polyvinyl chloride boots.
6	IS 12240 (Part 6): 1988 (Reaffirmed in 2023)	Methods of test for polyvinyl chloride boots: Part 6 Determination of tensile strength and elongation at break	This standard prescribes the test procedure for determination of the tensile strength and elongation at break of components for polyvinyl chloride boots.

List of standards on Methods of test for Safety Footwear

S No.	IS Number	Title	Key Provisions
7	IS 17011: 2018	Chemical requirements for footwear and footwear materials	This standard provides a list of critical chemical substances potentially present in footwear and its components, along with their potential risks, the materials in which they may be found, and the test methods used to quantify them.
8	IS 15298 (Part 1):2024/ ISO 20344: 2021	Personal protective equipment Part 1 Test methods for footwear (third revision)	This standard specifies methods for testing footwear designed as personal protective equipment.
9	IS 17275 (Part 1): 2019/ISO 22568-3 : 2019	Perforation Resistant Inserts for Protection of Feet - Specification Part 1 Metallic Perforation Resistant Inserts	This standard specifies requirements and test methods for the metallic perforation resistant inserts with resistance against mechanical perforation, intended to function as components of PPE footwear
10	IS 17275 (Part 2): 2019/ ISO 22568-4 : 2019	Perforation Resistant Inserts for Protection of Feet - Specification Part 2 Non-Metallic Perforation Resistant Inserts	This standard specifies requirements and test methods for the non-metallic inserts with resistance against mechanical perforation, intended to function as components of PPE footwear
11	IS 5852 (Part 1): 2019	Toe caps for protection of feet — Specification Part 1 Metallic toe caps (fifth revision)	This standard prescribes requirement and methods of sampling and test for metallic toe caps, used for reinforcement of the toe of the footwear.
12	IS 5852 (Part 2) : 2019/ISO 22568-2 : 2019	Toe Caps for Protection of Feet - Specification Part 2 Non-Metallic Toe Caps	This standard specifies requirements and test methods for non-metallic toecaps, intended to function as components of PPE footwear

List of standards on Methods of test for Safety Footwear

S No.	IS Number	Title	Key Provisions
13	IS 16915: 2018	Footwear — Critical substances potentially present in footwear and footwear components — Determination of phthalates in footwear materials	This standard specifies a test method to determine the presence of phthalate compounds. This test method is applicable to all types of footwear materials.
14	IS 17098: 2019	Footwear — Test methods for accessories: metallic accessories — Corrosion resistance	This standard specifies two methods for determining the propensity of a metal surface to either change visually due to contamination by atmospheric pollution (Method 1: sulphide tarnishing), or to corrode due to the action of salt water (Method 2: salt water corrosion).
15	IS 16914 (Part 2): 2018/ ISO 16373-2 : 2014	Textiles - Dyestuffs Part 2 General Method for the Determination of Extractable Dyestuffs including Allergenic and Carcinogenic Dyestuffs (Method using Pyridine-Water)	This standard specifies the analyses used to detect extractable dyestuffs in textile products, with the extraction performed for all kind of fibres and types of dyestuffs using pyridine/water. It lists the allergenic and carcinogenic dyestuffs which can be analysed using this method; the lists of dyestuffs are expandable.
16	IS 16914 (Part 3): 2018/ ISO 16373-3 : 2014	Textiles - Dyestuffs Part 3 Method for Determination of Certain Carcinogenic Dyestuffs (Method using Triethylamine / Methanol)	This standard specifies a method for the detection and quantitative determination of the presence of carcinogenic dyestuffs in dyed, printed or coated textile products by chromatographic analysis of their extracts.

INDIAN STANDARDS ON CODE OF PRACTICE FOR SAFETY FOOTWEAR MANUFACTURING

IS 13295: 1995 Code of practice for manufacture of safety leather boots and shoes for workers in the mines and heavy metal industries (Reaffirmed in 2023)

The standard provides a comprehensive code of practice for manufacturing safety leather boots and shoes for workers in mines and heavy metal industries, ensuring safety, durability, and quality.

Key Provisions:

- Detailed manufacturing processes include cutting, skiving, multi-row stitching, proper assembly, lasting techniques, and insertion of reinforcements like toe caps and stiffeners.
- Final finishing includes trimming, edge colouring, waxing, burnishing, and optional hobnail and toe-plate attachment for added durability.
- Footwear must be size-stamped, inspected for quality, and packed as agreed upon with the purchaser, supporting consistent production control and compliance.

IS 11264: 1985 Code of practice for manufacture of safety rubber canvas footwear for miners (Reaffirmed in 2021)

This standard recommends code of practice for the manufacture of safety rubber canvas footwear for miners.

Key Provisions:

- Provides manufacturing guidelines for safety rubber canvas boots for miners, covering design, material, and construction specifications.
- Emphasizes correct use of patterns, insoles, lasts, and steel toe caps to ensure proper fit, durability, and impact protection.
- Specifies material requirements like waterproofed cotton fabric, binding materials, threads, and rubber components with set strength and thickness standards.

INDIAN STANDARDS ON CODE OF PRACTICE FOR SAFETY FOOTWEAR MANUFACTURING

IS 6519:2021 Code of Practice for Selection Care and Repair of Safety Protective and Occupational Footwear

The standard provides a comprehensive code of practice for the selection, care, and repair of safety, protective, and occupational footwear, covering both leather and non-leather types used in various professional environments.

Key Provisions:

- The standard emphasizes proper sizing, fitting, and foot measurement techniques to ensure comfort and safety for the wearer, recommending the use of foot measuring devices and trial fittings.
- It outlines care procedures including cleaning, preservation, and drying methods for both personal and institutional settings, especially focusing on leather care to enhance durability and water resistance.
- Detailed repair guidelines are provided for soles, heels, uppers, and other components, emphasizing early intervention to extend footwear life and maintain safety standards.