

BUREAU OF INDIAN STANDARDS

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Draft Indian Standard

**GUIDE FOR SELECTION OF INDUSTRIAL SAFETY
EQUIPMENT FOR PROTECTION OF FOOT AND LEG**

(First Revision of IS 10667)

(ICS 13.340.50)

Occupational Safety and Health Sectional
Committee, CHD 08

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FOREWORD

(Formal clause shall be added later)

This standard is intended to guide workers and those in charge of their safety in industrial operations in selecting such protective equipment for foot and leg that will give the required protection against hazards likely to be encountered.

Foot injuries are caused due to:

- a) Striking against stationary object,
- b) Striking by moving object;
- c) Stepping on hot objects,
- d) Stepping on sharp objects,
- e) Heat radiation and welding sparks,
- f) Chemicals and microbiological contamination and
- g) Ergonomic risk

For foot protection it is also necessary for the employer to provide washrooms, showers, and locker facilities so that employees can conveniently bathe their feet and change into clean, dry footwear after the day's work.

This standard was originally published in 1983. In this first revision, the following modifications have been incorporated.

- a) Selection of equipment related to protection of foot and leg have been added as Annex B.
- b) References have been updated and
- c) Other editorial changes have been done to bring the standard in latest style and format of Indian Standards.

Indian Standards published on protection of foot and leg are given in Annex B.

Draft Indian Standard

**GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR
PROTECTION OF FOOT AND LEG**

(First Revision)

1 SCOPE

This standard provides guidance for selection, use and maintenance of safety boots, shoes and leg guards.

2 REFERENCES

The standards listed in Annex A contains 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 revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TYPES

The protective footwear should suit the job, that is, their construction and materials should provide adequate defence against all hazards the workers may encounter. The type of safety selection shall be based on risk assessment of the task.

3.1 Safety shoes have the widest application in industry. The metal and composite cap built into the shoe is meant to shield the toes from impact and compression. When there is a heavy lift truck traffic in a plant, or other added risk of injury to the toe/foot metatarsal guards offer additional protection.

3.2 Safety boots and rubber shoes offer protection against wet, cold or slippery conditions such as in outdoor work, refineries, chemical and food processing plants. If worn over safety shoes, overboots do not need any reinforcement in the toe area. If worn over bare feet shots, overboots should have built-in toe caps.

3.3 Conductive shoes and over-shoes, worn round explosive gases or material, permit the static electricity that builds up in the body of the wearer to drain off harmlessly into a conductive, grounded floor. Employee should not be allowed to wear them outdoors because any accumulation of dirt impairs effectiveness of conductive shoes. Electrical resistance of the shoes should be tested periodically while they are in service.

3.4 Non-sparking shoes are used in hazardous locations such as in explosive operations or in the cleaning of tanks that have held gasoline or volatile hydrocarbons.

3.5 Shoes for protection from electrical hazards should not have any exposed metal; the toe box should be insulated from the shoe. Electrical hazard shoes can be depended on for protection when they are dry and in good condition; however, protection is diminished when they are wet from perspiration or rain.

3.6 Foundry safety boots for moulders and welders are used whenever there is a hazard from hot splashes, such as, in the pouring of molten metals, or flying sparks. They fit snugly and should be

as easy as possible to remove in case a spark or hot metal gets inside. Instead of being closed by laces, they should have other suitable fasteners to hold the top of the shoe close to the ankle.

3.7 Leather Safety Boots and Shoes - In safety shoes the sole and steel toe are of prime importance. The sole leather used in safety shoes/boots shall conform to IS 579.

3.8 PVC and Rubber Gumboots — There are two varieties in rubber gumboots that is general purposes and industrial. Only industrial gumboots should be employed for use when the hazard is handling stronger or mild acids, alkalies and corrosive chemicals. PVC half gumboots made from pure vinyl is also ideal for protection against acids and alkalies. Use of PVC apron along with PVC half gumboots is recommended for obtaining required frontal body protection.

4 LEG PROTECTION

4.1 Foot guards that are added outside the shoe can provide significant protection where there are hazards from moving objects. Combination foot and shin guards can be used where there is danger from flying particles such as jack hammer work. Strap on wooden soled sandals can be used for protection against under foot hazards of heat, oil, acids, hot water, caustics and sharp objects.

4.2 Leg protection is also secured by various types of leggings, from waist length to those that reach only part way to the knees. The length and material to be used depend upon the Hazards involved.

4.3 For protection against molten metal, leggings should be instantly removable in an emergency. They should also have large flaps to protect the instep and heel and be free from projecting buckles and clamps.

4.4 Leather is used where it is necessary to protect against molten metal, sparks and heat. Fire resisting duck and wool may be used against light spatters and sparks. Leggings are known as 'spring' type because no fasteners are used to afford easy removal. These may be furnished with an inner fibre shield as protection against leg bruises and affording effective shedding of molten material. Others of metal construction are also used where the sole hazard is injurious to the shin through bumps and bruises.

4.5 Where acids, alkalies and hot water are encountered, natural or synthetic rubber or any other synthetic material may be used, depending upon the hazard encountered.

4.6 Spats of leather, fire resisting duck, wool or asbestos are used by men whose ankles and shoe top may be exposed to molten metal or sparks. Welders find this equipment useful particularly in close work. Man so equipped should wear their trouser legs over the spats unless the latter are closely bound to prevent sparks or hot metal from entering at the top of the spat.

4.7 Knee pads of asbestos, fibre, felt or reinforced leather are used as protection against heat and sharp edges encountered in steel mills, glass plant operations, sheet metal plants, mines and similar industries. Knee pads of rubber construction are also furnished to workers who are required to remain on their knees for extended periods of time, such as cement finishers, etc.

4.8 Leg Guard — Leather leg guard of 225 mm size should be used by welders to protect the leg from welding sparks and to avoid entering of sparks inside the safety boots. Leg guard of 400 mm size should be used by workers engaged in loading the curled chips in the machine shop.

5 SELECTION, FITTING AND INSPECTION

5.1 Supervisors and employees should be advised to select the proper type of safety shoe for each job. Recommend the proper type shoe. For example, workers on wet slip floors may need non-slip sole shoes which will not be harmed by water or acid. For more severe exposures of this type, provide over-shoes, boots, wooden sole shoes or wooden or rubber mat sandals.

5.2 Select synthetic rubber or chrome leather soles for work on oily ground or floors because ordinary rubber or leather deteriorates under such exposure.

5.3 For excessively heated or sharp material on the floor, use fire and heat resistant shoes.

5.4 Furnish external toe or foot guards when there is need for additional protection because of heavy material handled or because of severe exposure to abrasion and sharp metal which otherwise would cut the leather uppers.

5.5 All employees buying shoes should understand the need for proper fitting. The workers feet will spread, especially if heavy loads are carried; hence measurement of length and width should be taken with the weight of the body on the feet.

5.6 Shoes that do not fit tempt the wearer to mutilate them in an effort to secure comfort.

6 CLEANING, DRESSING, STERILIZATION AND REPAIR

6.1 Encourage employees to clean and dress their shoes frequently.

6.2 Sterilize the shoes if required as per instructions of the manufacturer.

6.3 Do not allow shoes to wear or deteriorate beyond a condition suitable for repair, whether the repair is undertaken by the employee or employer.

6.4 Replace worn soles before wearing down the inner soles.

6.5 Replace run down heels before the weight of the wearer forces counters and other parts out of shape.

6.6 Conductive sole shoes, designed to prevent the accumulation of body static charges, as well as antispark and shock resistant types require special attention. Only repairmen thoroughly familiar with their construction and trained in approved methods of repairs should attempt this work. The advice of the manufacturer should be sought.

7 USE AND CARE

7.1 It should be ensured that employee gets a comfortable shoe; a good fitting will not cramp or chafe the feet on the job and it will wear longer.

7.2 Shoes should be kept in good repair. Worn out soles and run down heels are dangerous.

7.3 Clean the shoes frequently.

7.4 Keep shoes as dry as possible. If they get wet, dry them slowly. Wet leather will be damaged by heat greater than the hand can bear.

7.5 Wash the feet and change socks daily. Perspiration harms the leather and causes the lining to wear out and become rough.

7.6 Wear heavy cotton or woollen socks which absorb perspiration better and wear longer than thin nylon, silk or rayon socks.

7.7 Avoid stepping on or kicking against sharp metal; scraper other material which may damage shoes or may cause foot injury.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>
IS 579 : 2017	Vegetable tanned sole leather - Specification (<i>fourth revision</i>)
IS 11226 : 1993	Leather safety footwear having direct moulded rubber sole specification (<i>first revision</i>)
IS 14544 : 2022	Leather safety and protective footwear with direct moulded polyvinyl chloride pvc sole - specification (<i>first revision</i>)
IS 15298 (Part 2) : 2016 ISO 20345: 2011	Personal protective equipment: Part 2 safety footwear (<i>second revision</i>)
IS 15298 (Part 3) : 2019 ISO 20346:2014	Personal protective equipment: Part 3 protective footwear (<i>second revision</i>)
IS 16645 : 2018 ISO 5423 : 1992	Moulded Plastics Footwear " Lined or Unlined Polyurethane Boots for General Industrial use " Specification
IS 17012 : 2018	High ankle tactical boots with pu - Rubber sole - Specification
IS 17043 (Part 1) : 2024	Shoes - Specification Part 1 Shoes for Services
IS 16994 : 2018	Footwear for Men and Women for Municipal Scavenging Work
IS 17037 : 2018	Anti riot shoes - Specification
IS 17861 : 2022	Textile boots with polymeric sole jungle boots - specification (<i>third revision</i>)
IS 1989 (Part 1) : 1986	Specification for leather safety boots and shoes: Part 1 for miners (<i>fourth revision</i>)
IS 1989 (Part 2) : 1986	Specification for leather safety boots and shoes: Part 2 for heavy metal industries (<i>fourth revision</i>)
IS 3976 : 2018	Safety Rubber Canvas Boots for Miners " " Specification (<i>sixth revision</i>)
IS 5557 : 2004	Industrial and protective rubber knee and ankle boots - Specification (<i>fourth revision</i>)
IS 5557 (Part 2) : 2018	All rubber gum boots and ankle boots: Part 2 occupational purposes

ANNEX B
(Foreword)

Indian Standard	Typical Operations	Hazard Description
IS 11226	Used by workers of mines, refiners, fertilizer plants, or places where working surface is oily.	Impact, Cut, Vibration, Abrasion, Slip
IS 14544	Used in the industry and with general purpose resistance to oils and chemical	Solvents, Oil & Grease
IS 15298 (Part 2) IS 15298 (Part 3)	Used for general purpose, for example, mechanical risks, slip resistance, thermal risks, and ergonomic behavior.	Striking against stationary object, Striking by moving object; Stepping on hot objects, Stepping on sharp objects,
IS 16645	Ankle boots to full thigh height inclusive used for general industrial purpose	Ergonomic Risk
IS 17012	Used for grueling marches and operations during heat or rain, or facing obstacles in day to day work to keep the feet protected and comfortable	Ergonomic Risk
IS 17043 (Part 1)	Generally used by armed forces/police forces for daily wear and for marching purposes	Ergonomic Risk
IS 16994	Used by Municipal workers exposed to unhygienic conditions during their scavenging work	Chemical and Biological hazard
IS 17037	Safety shoes meant for use by police forces/paramilitary forces when handling hostile situations	Injuries from stones, fire, sharp objects, water, oil, electric shock and slip.
IS 17861 : 2022	Used by police forces, paramilitary forces, similar security agencies and trekkers in carrying out their work. These boots are designed such that they can withstand long strenuous working and walking conditions.	Ergonomic Risk, Slip
IS 1989 (Part 1)	Used in coal mines, especially by categories of workers like trammers and shot firers suitable for most of the surface mines of coal, limestone, iron ore, etc.	Impact, Cut, Vibration, Abrasion, Slip
IS 1989 (Part 2)	Safety boots and shoes for workers engaged in heavy metal industries	Impact, Cut, Vibration, Abrasion, Slip
IS 3976	Used by workers engaged in underground mining of coal, mica, silica, clay, stone and other minerals where wet surface condition is prevalent	Impact, Cut, Vibration, Abrasion, Slip
IS 5557	Used in mines as well as for workmen in heavy metal industries and where the floor is covered with water, chemicals, oil, grease, waxes, lubricants etc.	Impact, Cut, Vibration, Abrasion, Slip
IS 5557 (Part 2)	Recommended for use in tanneries, food and beverage industries, sewage treatment plant, Petrochemical industries, pharmaceutical	Chemical and Biological hazard

	industries, garbage disposal and related municipal operations, cement and construction work, road building, etc.	
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