



Foot Protection Standard: Selection and Use

In University workplaces, falling or rolling objects, sharp objects, exposed energized electrical conductors or other hazards can create a potential for foot injury. Whenever practicable, these hazards shall be eliminated or reduced through the use of proper engineering and/or administrative controls. To protect against those hazards that continue to exist after all such control measures have been implemented, appropriate protective footwear must be used. This standard is based on the Canadian Standards Association (CSA) Standards Z195-09, "Protective Footwear" and Z195.1-02, "Guideline on Selection, Care, and use of Protective Footwear."

SCOPE:

Any worker who may be exposed to foot injury from an operation or process conducted within a University of Toronto workplace.

Note: In this standard, "worker" includes faculty, staff, students, and visitors.

RESPONSIBILITIES:

Principal investigators / supervisors and all others in authority shall:

- Identify situations where foot protection is required;
- Determine (using this standard or in conjunction with the Office of Environmental Health and Safety) the type of protective footwear required for the specific foot hazards;
- Provide employees with appropriate protective footwear;
- Ensure that workers are informed in the proper use, care and maintenance of protective footwear; and
- Ensure that workers wear appropriate protective footwear at all times in areas where foot hazards exist.

Workers shall:

- Wear appropriate foot protection at all times in foot hazard areas; and
- Maintain protective footwear in good condition.

PERSONAL PROTECTIVE FOOTWEAR:

Injuries to the foot may be prevented by the use of appropriate protective footwear, as part of an overall foot protection program. Appropriate protective footwear must protect against the specific hazards presented, provide a comfortable and secure fit, and comply with CSA Standards Z195-09 and Z195.1-02.

Appendix A summarizes the categories of recommended safety footwear and their protective capabilities as suggested by CSA.

The following outlines the general categories of protection provided by safety footwear:

a) Protective Toecap Impact Resistance Footwear

Safety footwear that provides adequate protection against toe impact must be worn by those who are exposed to potential impact injury to the toes. All safety footwear must comply with CSA Standard Z195-09. CSA-approved safety footwear must have a shield incorporated into a boot or shoe that provides protection against impact to the toes. There are two grades of protective toecap impact resistance footwear depending on the degree of impact protection provided:

Grade 1

- Withstands an impact of 125 joules (the equivalent of a 50 pound object dropped at a height of 22 inches).
- With protective soles: shall be permanently have a green equilateral triangle with sides measuring not less than 20 mm sewn or attached to the right boot or shoe upper or tongue at conspicuous location.
- Without protective soles: shall be marked with a blue rectangular patch, measuring approximately 15 mm x 12 mm sewn or attached to the right boot or shoe upper or tongue at conspicuous location.

Grade 2

- Withstands an impact of 90 joules (the equivalent of a 50 pound object dropped at a height of 16 inches)
- With protective soles: shall be permanently have a yellow equilateral triangle with sides measuring not less than 20 mm sewn or attached to the right boot or shoe upper or tongue at conspicuous location.
- Without protective soles: shall be marked with a grey rectangular patch, measuring approximately 15 mm x 12 mm sewn or attached to the right boot or shoe upper or tongue at conspicuous location.

Protective toecap impact resistance footwear must be worn where there are hazards of falling objects, rolling objects, sharp objects, hot objects, and saw cutting. This may include workplaces where heavy materials are handled, heavy equipment or machinery is used, construction sites, or machine shops.

b) Protective Sole Puncture Resistance

Safety footwear which provides adequate protection against penetration of sharp objects into the bottom of the foot must be worn by those who are exposed to potential puncture to the foot. All safety footwear must comply with CSA Standard Z195-09. CSA-approved safety footwear incorporates a plate into the sole of a boot or shoe.

Protective footwear with sole puncture resistance must be worn where there are hazards of sharp objects (such as nails, wire, tacks, scrap metal, or glass), hot objects, or saw cutting.

c) Metatarsal Protector Impact Resistance

Safety footwear that provides adequate protection against metatarsal impact must be worn by those who are exposed to potential impact injury to the metatarsal. All safety footwear must comply with CSA Standard Z195-09. CSA-approved safety footwear must have a shield over the top of the foot with sufficient width and height, attached to the shoe or boot that provides protection against impact to the metatarsal area of the foot.

Protective footwear with metatarsal impact resistance must be worn where there are hazards of falling objects, rolling objects, sharp objects, hot objects, and saw cutting.

d) Electric Shock-Resistant Footwear

Safety footwear that provides adequate protection against electrical shock must be worn by those who may be exposed to potential live electrical conductors. All safety footwear must comply with

CSA Standard Z195-09. CSA-approved safety footwear must have a sole and heel constructed of electrically insulating materials that provides protection against electric shock (to at least 18 kilovolts and 60 Herz) to the bottom of the foot. Such foot protection is provided under dry conditions and the insulating properties of such footwear will deteriorate in wet environments and with wear.

Protective footwear with electric shock-resistant soles must be worn where there are hazards of electric shock but must not be used where there are static discharges or micro-circuit hazards.

Footwear incorporating electric-shock-resistant soles shall be permanently marked by a white rectangular patch with orange Greek letter Omega and shall measure approximately 16 mm x 25mm.

e) Static Dissipative Footwear

In some workplaces, such as where flammable or explosive materials are present or where the buildup of static electricity must be minimized, workers may be required to wear static dissipative footwear. Static dissipative footwear incorporates a sole that allows small charges of electricity to be dissipated into the walking surface, thus reducing the accumulation of static electricity.

Static dissipative footwear must be not worn where there is a hazard of electric shock (such as around open electrical circuits or highly charged electrical equipment), as static dissipative footwear offers no protection.

Footwear incorporating static-dissipative soles shall be permanently attached by a rectangular patch with a fluorescent yellow background and marked with a prominent green "SD" notation. Below the notation the patch shall show an electric ground symbol, and shall measure approximately 16 mm x 25mm.

f) Conductive Footwear

In workplaces where there is a hazard of static ignition, conductive sole protective footwear must be worn. Conductive footwear incorporates a sole that is constructed of a conductive material designed to electrically ground the foot. It should be noted that in addition to wearing conductive sole footwear, all containers and equipment in the area should be grounded. Conductive soles should not be worn where there is a hazard of electric shock, as they offer no protection. Conductive sole footwear must comply with the requirements of CSA Standard Z195-09.

Footwear incorporating electrically conductive soles shall be permanently attached by a rectangular patch with a red background and marked with a black "C" notation. Below the notation the patch shall show an electric ground symbol, and shall measure approximately 16 mm x 25 mm.

g) Chainsaw Protective Footwear

Workers who use chainsaws and are exposed to saw cutting hazards must wear boots that are designed to prevent a chainsaw from cutting into the shin, ankle, foot, and toes.

Chainsaw-protective footwear shall be marked with a square patch and permanently attached to the right boot or shoe. The patch shall be white label with green fir tree and shall measure approximately 16 mm x 25 mm.

Note: CSA Standard Z195-09 points out that worker must always choose footwear that will provide the protection they need. It should not be assumed that a certain type of job always demands the same footwear. Different working environments may present different hazards. In addition, some work

environments may contain multiple hazards. In such cases, footwear that provides protection in more than one category (combined performance) should be selected.

Protective Footwear in Chemical Laboratories

Appropriate protective footwear must be worn at all times in laboratories where chemicals are used and stored. Perforated shoes, sandals and the like must not be worn in these laboratories. Appropriate shoes must cover and protect the entire foot. Shoe materials, including soles and uppers, must be compatible with the laboratory environment, the materials handled, and the tasks conducted.

Depending on the types of hazards in the laboratory, footwear which provides additional protection may be warranted. Shoes with soles that are resistant to slip, abrasion, oils or heat may need to be considered. Where the potential exists for foot injury due to impact, puncture, electrical shock, or static electricity, appropriate CSA-approved footwear must be worn (see above).

Protective Footwear in Mechanical Rooms

Appropriate CSA approved protective footwear must be worn at all times in Mechanical Rooms. Appropriate shoes must cover and protect the entire foot. Shoe materials, including soles and uppers, must be compatible with the environment, the materials handled and the tasks conducted.

Where designated, walkthrough areas of Mechanical Rooms may be exempt from CSA approved footwear. However, perforated shoes, sandals and the like must not be worn in Mechanical Rooms. Heels shall not exceed 1 inch and shall have at least a 1" square base on the heel.









APPENDIX A -- RECOMMENDED SAFETY FOOTWEAR PROTECTION AND THEIR CAPABILITIES

Nature of Hazard	Hazardous activities involving but not limited to:	Protective toe	Protective sole	Metatarsal protector	Electrical insulation	Static dissipation	Conductive sole	Chainsaw protection
Falling objects	<ul style="list-style-type: none"> - Construction sites - Handling heavy materials, heavy equipment or machinery - Handling large, heavy animals - Metal machining shops - Woodworking shops 	✓✓		✓✓				
Rolling objects	<ul style="list-style-type: none"> - Construction sites - Handling heavy materials, heavy equipment or machinery - Handling large, heavy animals - Metal machining shops - Woodworking shops 	✓✓ (Select Grade 1 toe protection)		✓✓				
Sharp objects	<ul style="list-style-type: none"> - Presence of sharp objects on ground, such as nails, wire, tacks, scrap metal or glass 	✓✓	✓✓	✓✓				
Hot objects	-	✓ (Select thermal-insulating footwear)	✓ (Select thermal-insulating footwear)	✓ (Select thermal-insulating footwear)				
Electric shock	<ul style="list-style-type: none"> - Presence of live electrical conductors - Construction worksites 				✓✓	X	X	

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- ✓✓ - Highly recommended
- ✓ - Recommended
- X - Do not use!

Static discharge Micro-circuits	- Handling of sensitive electronic equipment				X	✓✓		
Static ignition	- Presence of flammable or explosive materials - Handling of sensitive electronic equipment				X		✓✓	
Saw cutting	- Construction worksites - Woodworking shops	✓✓	✓	✓				✓✓

Nature of Hazard	Hazardous activities involving but not limited to:	Protective toe	Protective sole	Metatarsal protector	Electrical insulation	Static dissipation	Conductive sole	Chainsaw protection
<p>PROTECTIVE FOOTWEAR MARKINGS:</p>		<p>Green Triangle -- Sole puncture protection with a Grade 1 protective toe to withstand impacts up to 125 joules</p> 		<p>White Rectangle with Orange Greek letter Omega -- indicates soles that provide resistance to electric shock</p> 	<p>Yellow rectangle with green "SD" and grounding symbol -- indicates soles are static dissipative</p> 	<p>Red rectangle with black "C" and grounding symbol -- indicates soles are electrically conductive.</p> 	<p>White label with green fir tree -- indicates chainsaw protective footwear.</p> 	
		<p>Blue Rectangle -- footwear provides Grade 1 protective toe with no protective sole</p> 						
		<p>Yellow Triangle -- Sole puncture protection with a Grade 2 protective toe to withstand impacts up to 90 joules</p> 						
		<p>Grey Rectangle -- footwear provides Grade 2 protective toe with no protective sole</p> 						

- ✓✓ - Highly recommended
- ✓ - Recommended
- X - Do not use!

APPENDIX B -- PERFORMANCE RATINGS OF FOOTWEAR SOLES

SOLE MATERIAL	RESISTANCE PROPERTIES E: Excellent G: Good F: Fair P: Poor								
	ABRASION	METAL CHIPS	CHEMICAL	CUSHION	CEMENT	SLIPPING	WATER	OIL	HEAT
Blown rubber	G	F	F	E	E	G	G	G	F
Vulcanized PVC	G	G	F	G	G	F	G	G	G
Vibram	E	E	G	E	E	E	E	G	E
Leather	F	F	F	G	G	G	P	F	P
Vinyl Flex	G	F	F	E	E	E	G	G	F
Chemigum (Ambergum)	E	G	G	E	E	E	E	E	E
Neoprene	E	G	E	G	E	G	E	E	G
Krayton	E	F	F	E	G	G	G	F	F
Neo Crepe	G	F	F	E	G	E	G	G	P
Rubber (Vulcanized Rubber)	E	G	G	E	E	G	E	G	G
Nitrile (Nitrilegum)	E	G	E	G	E	E	E	E	G
Dynatread	E	E	G	G	E	E	E	G	G
Sur-Sport Rubber	G	G	E	E	G	E	E	E	G
Polyurethane	E	F	E	E	E	G	E	E	G
Vylyt	F	P	E	G	G	E	E	E	F
Crepe	G	E	G	G	E	G	E	G	G

Adapted from a Safety Infogram produced by the Canadian Centre for Occupational Health and Safety (CCOHS)