CSA Standard Z195-02
Protective Footwear

Scope and Application:
This standard addresses two grades of toe impact protection; sole plate performance; metatarsal protection; electric-shock protection; sole flexation; conductivity; and chainsaw protection for protective footwear. It also applies to static dissipative footwear with and without toe impact resistance. Electrical flash, flame protection, fire fighter, spiked climbers footwear and riot boots are not covered in this standard.

Definitions:
- Conductive footwear - a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot.
- Electric shock resistant sole – a sole and heel design and method of attachment to the footwear that at the point of manufacturing had electrical insulating properties.

Design Requirements include:
- protective toe caps to be incorporated into footwear during construction,
- protective soles to cover the maximum area of sole including the heel,
- metatarsal protectors to cover complete dorsum of foot and be an integral part of footwear,
- heel is to be higher than ball of foot,
- electric shock resistant footwear to have a sole and heel not penetrated by conductive material,
- chain saw protective footwear to have a steel toe cap no less than 1.6 mm in thickness, and
- static-dissipative footwear and conductive footwear shall meet test specific requirements.

Performance requirements are outlined for protective toe cap to withstand fracture at specified energy/velocity of a strike and protective sole to withstand a force of 1200 N, and 1.5 million flexes. In addition, toe cap, sole and metatarsal protection shall be corrosion resistant. Electric shock resistant footwear shall withstand a test potential of 18kV 60 Hz for 1 minute, with no discharge to the ground, and current leakage shall not exceed 1 mA according to test methods. Static-dissipative footwear shall be in the range of 1 million and 100 ohms in 5 seconds and conductive footwear in the range of 0 to 500,000 ohms in 5 seconds. Chainsaw footwear shall prevent a chainsaw from cutting all the way through the boot and through toe cap.

Testing details for manufacturers include that testing be carried out on new specimens selected at random, conditioned for temperature and humidity, for toe cap resistance the striker have mass of 22.7 kg falling in a guide tube on guide rails, impact energy be determined in joules (j) by $E=\frac{1}{2}mv^2$, where $m$ is the mass of the striker, $v$ the velocity in meters/second. Test requirements are defined for sample preparation and test procedures and the plasticine cylinder measured to establish results. The protective sole is subjected to a sole pin penetration test; each pin is limited to 200 tests. Test equipment and procedures are also outlined for sole flexing, electric shock resistant footwear, static dissipative footwear, conductive footwear and chain saw footwear.

Footwear Categories relate to 6 applications:
- Grade 1 having sole and toe protection with an impact resistance of 125 joules
- Grade 2 having sole and toe protection with an impact resistance of 90 joules
- Electric shock resistant footwear
- Static-dissipative footwear
- Conductive footwear
- Chainsaw protective footwear.
Markings shall be permanently and conspicuously placed on at least one shoe or boot of the pair. The information shall include manufacturer’s name, trade mark or trade name, certification agency’s identification number and the month and year of manufacturing. The certifying agency is to be identified on the label itself.

A labeling system is established in the standard to easily identify the classes of footwear. The labels are shown and described in a chart for each class of footwear:

- green triangle for Grade 1
- yellow triangle for grade 2
- white rectangle and ohm symbol for shock resistant
- red rectangle for static-dissipative
- white rectangle with a tree symbol for chainsaw protective

In addition, a five-place alpha-numeric code shall be permanently in place inside the footwear to identify the protection class by number and letter:

- 1 or 2 (for grade 1 or 2)
- P or 0 (puncture resistant)
- M or 0 (metatarsal resistant)
- E, S or C (shock resistant, static-dissipative or conductive)
- X or 0 (chain saw) (for example 1 P M E X)

Slip resistance is addressed in appendix A. Design factors outlined for consideration when selecting slip-resistant soles include shape of sole, tread, shape of heel, softness and hardness of the sole. Work environment considerations include type of flooring, floor finish, dry wet surfaces, temperature of air and floor.

Charts and diagrams are included for tests requirements and procedures and for marking labels and foot parts.

This bulletin contains a summary of excerpts taken from the Standard, for general information purposes only. This bulletin is not reflective of the complete requirements that the Standard prescribes.

Note: Manitoba Regulation M.R. 217/2006 Section 1.4 inconsistency:
If there is an inconsistency between this regulation and a requirement contained in a publication, code or standard referenced in this regulation, the provisions in this regulation prevail.