

Protective Footwear and Metatarsal Protection by Esco Buff, PhD, APF, CF

Eventually every farrier will have at least one horse step on their toes, stomp or place a foot down heavily onto your foot. Clearly Protective Footwear and metatarsal protectors can help reduce the damage to your foot. Not all protective footwear is safe to use in the farrier industry and being an educated consumer will help prevent a protective footwear failure and potential injury.

If you decide you are going to wear protective footwear and/or metatarsal protectors around horses, then you will need to make sure you buy the quality that will work for the amount of pounds a horse could impact and/or compress onto your foot and metatarsals. Some protective footwear sold in stores does not meet the minimum requirements set by the American Society of Testing and Materials or ASTM.

Impact Rating (I)

Protective Footwear is tested to meet one of two units of measurement for impact rating; 50 or 75 foot- pounds. This test is performed by dropping a weight from a predetermined height at a designated speed. I/50 rated footwear will protect the toes from an impact of up to 50 foot-pounds and I/75 rated footwear will protect the toes from an impact of up to 75 foot-pounds. This means that I/75 foot-pounds is the equivalent of 25 lbs. dropped from a height of 3 feet (3 ft. x 25 lbs. = 75 foot-pounds). I/50 foot-pounds is the equivalent of 25 lbs. dropped from a height of 2 feet.

Compression Rating (C)

Protective Footwear is tested to meet one of two units of measurement for compression rating; 50 = 1,750 pounds and 75 = 2,500 pounds. This test is performed by applying a load up to the designated number of pounds before the toe cap begins to crush or crack. Therefore a C/50 rated footwear will protect the toes from compressive loads up to 1,750 pounds and a C/75 rated footwear will protect the toes from compressive loads up to 2,500 pounds.

Protective Footwear

Protective footwear can meet all or some of the specific elements of the ASTM standard, as long as it first meets the requirements for impact and compression resistance. All footwear (boots, sneakers, and clogs) manufactured to the ASTM specification must be marked with the specific portion of the standard with which it complies. One shoe of each pair must be clearly and legibly marked (stitched in, stamped on, pressure-sensitive label, etc.) on either the surface of the tongue, gusset, shaft, or quarter lining. Protective footwear can come in steel or composite toe caps. A composite toe is essentially the same as a steel toe, but it is non-metallic and non-magnetic. It is slightly lighter in weight than a steel toe cap, but meets the same ASTM safety requirements as a steel toe.

Here are the ASTM specifications:

M = Footwear designed for a male.

F = Footwear designed for a female.

I/50 = Impact Resistant in foot-pounds

I/75 = Impact Resistant in foot-pounds

C/50 = Compression Resistance (50 is equal to 1,750 lbs.)

C/75 = Compression Resistance (75 is equal to 2,500 lbs.)

Mt/75 = Metatarsal Resistance Rating (75 foot-lbs.)

How to Read the Protective Footwear label.

For example:

ASTM F2413-11

M I/75/C/75/Mt75

PR

CS

ASTM F2413 refers to the performance requirement for foot protection. The additional digits following the standard designation indicate the year of the standard to which the protective footwear complies. 11 refers to 2011.

The next line indicates the intended gender of the user. M for male and F for Female. It also identifies the existence of impact resistance (I), the impact resistance rating (50 or 75), compression resistance (C) and the compression resistance rating (50 or 75), the metatarsal designation (Mt) and rating (50 or 75).

The next lines are used to classify footwear that meet other specific types requirements such as: conductive (Cd) properties, footwear designed to reduce the accumulation of excess static electricity (SD), electrical insulation properties (EH), puncture resistance (PR), chain saw cut resistance (CS) and dielectric insulation (DI).

Metatarsal Guard Add-On Protection

ANSI and the ASTM standards do not allow for the use of add-on devices such as strap-on foot, toe or metatarsal guards, as a substitute for protective footwear. All protective toe caps or metatarsal guards must be designed, constructed and manufactured into the protective footwear during the manufacturing process and tested as an integral part of the footwear in order to meet the standards. On the other hand, OSHA does not exclude add-on devices for extra protection. Metatarsal guards are an ideal add-on protection for farriers as they add protection to the top of the foot. If you decide to choose an add-on metatarsal guard, make sure the rating is of sufficient impact and compression desired.

Impact and Compression for the farrier

Compression Resistance is less of an issue for the farrier than impact. A C/50 rated footwear will compress when 1,750 pounds is applied to it. For the most part, this would take care of most incidences of compression, even if a horse was rearing up with all its weight on one leg on you

footwear. C/75 rated for 2,500 pounds probably a smarter choice if working around draft horses. A 1,000 pound horse walking over your foot can exert around 809 pounds of force and up to 1,800 pounds at the trot.

Impact Resistance should be more of a concern for the farrier. I/50 means the footwear will protect your foot from a 25 pound weight dropped from two feet. I/75 means the footwear will protect your foot from a 25 pound weight, dropped from three feet. What happens if a 1,000 pound horse slams their foot down onto your footwear? No known research has been found for such testing however estimates of impact could be well above 300 pounds. Since most protective footwear could fail in those circumstances, add-on metatarsal protection can help deflect a blow thus causing far less injury if any.

It's obvious that protective footwear is not going to completely avoid foot injuries. However, compared to unprotective footwear, appropriately rated protective footwear can offer much more protection, thus resulting in less overall foot injuries.

References:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9777 (OSHA Standards for protective footwear)

<http://www.astm.org/Standards/F2413.htm> (ASTM F2413 - 11 Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear)