



Toecap 101

When you have to choose your new pair of safety footwear you need to know what type of toecap it should have.

How many different **toecap materials** are available? What is the difference between the different **toecap materials**? **Lets explain to you technically what to do if you need safety shoes but you don't know what type of toecap material you should choose.**

Its very easy it is to find the perfect product.



Pertinent Questions:

- Do you really need metal-free safety footwear? Write reason (s).
- Do you need toecaps with exceptional resistance to impacts?
- Do you need sport and not so “bulky” style safety footwear?
- Do you need the lightest possible safety footwear?

There’s a huge variety of needs & you have to choose, let us explain technically what is available, and what to look for to find the perfect toecap for your needs.

Let’s start with a short description of a toecap:

Toecaps have to protect the toes from impacts and from compressions, but the choice between the different types of **toecaps** is related not only to protection but also to comfort, type of job, type of feet. So the material of the toecap and its shape to be chosen can be different.

Following the standard EN 12568 all the toecaps give protection from impacts up to 200J and compression up to 15kn. The difference between the various toecaps can be found basically in weight, type of protection, cost.



Most common toecap materials & basic properties:

1. Steel
2. Aluminum
3. Carbon fiber
4. Fiberglass
5. Plastic

Let's divide them in Metallic and Non Metallic toecaps:

METALLIC TOE CAPS:

They are the history of safety footwear, as the first safety footwear was made with steel toecap. Steel toecaps are strong, thin and economic. In the Northern European markets they are very much appreciated for the high level of protection, not really for the lightness. The average weight is about 80/90gr. The best application is in regular work footwear, not really for sport styles because they are a bit heavy.

Some additional details:

- ✓ Resists to weight of a forklift of a 4.5 Ton & do not weaken over time.
- ✓ Resists to the chain of a chainsaw
- ✓ The impact test gives good results but not great memory effect.
- ✓ The thermal insulation is not good so better to avoid in extreme temperatures.
Have high puncture resistance
- ✓ They don't shatter, and contrary to popular myth, they don't snap, resulting in toe amputation!
- ✓ Good value – steel caps are more economical to produce than composite toe caps, so they are often cheaper to buy as well
- ✓ Pass ASTM tests, meaning they are considered safe for workers in live electrical atmosphere as they are enclosed in non conducting material
- ✓ Do not weaken over time
- ✓ Cheap non powder coated steel toecaps could develop rust
- ✓ Heavier than composite yet steel toe footwear is improving & getting lighter.
- ✓ Set off metal detectors: annoying for those who regularly pass metal detectors

THE STEEL TOES ARE PROBABLY THE BEST CHOICE IF THERE IS DANGER OF HEAVY OBJECTS CRUSHING YOUR TOES

ALUMINUM toecaps (also known as “alloy toe”) have been developed to bring the resistance of steel toes to a lighter weight (30% lighter than steel). Of course they are a compromise between resistance & weight. We would go with a steel toecap if extreme resistance is needed & aluminum toe if both weight and good resistance were needed. A difference between aluminum toecaps and composite toecaps is that both are light, though aluminum toes are not metal free, however they have a low profile, which makes them ideal for sport shoes; Composite toe caps are metal free but they are a little too “bulbous” for sport & ladies shoes. The average weight of the aluminum toe is about 50/60gr. The thermal insulation is also like steel.



NON-METALLIC TOE CAPS:

The most common material used is carbon fiber, fiberglass or blend of plastics.

COMPOSITE: These are toecaps made of blend of two or more type of plastic material, are light, moderately priced & also metal free. Their profile is a little bit “bulbous” because of increased height so they’re not the best solution for sleek safety footwear. They are around 8-9 mm thick (as compared to 1.6-1.8 mm in steel Toecap) in order to pass the impact & compression tests and has the same resistance of other materials, plastic toecaps have to be built a bit thicker. The average weight is about 65 gr.



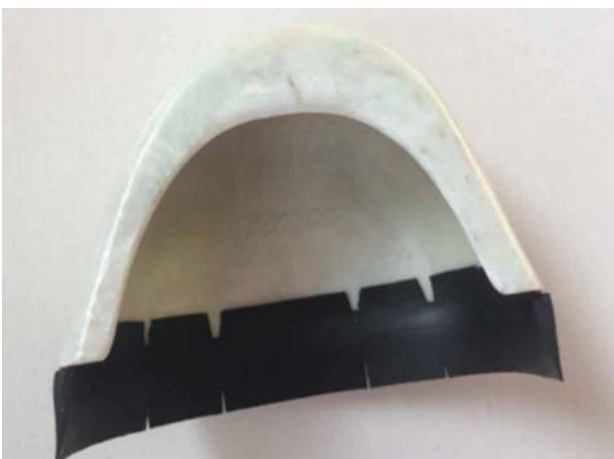
Some additional details:

- ✓ Cannot withstand the same level of down force as steel caps Average puncture resistance. Poor Chainsaw resistance.
- ✓ The thermal insulation is good; they are great for high (not more than 150°C) or low temperatures. Toes stay warmer in the cold & cooler in the heat.
- ✓ The composition of the material makes it not electricity conductive.
- ✓ Have a memory – meaning they spring back to original shape after injury.
- ✓ Non-metal materials meaning they don’t set off metal detectors, making them great for FIFO workers as they pass through airport security
- ✓ Superior electrical resistance for those working around live wires
- ✓ More expensive to produce, leading to a higher purchase price
- ✓ Caps are often thicker and more bulbous, meaning they cannot be used in as many styles of footwear as steel caps
- ✓ Generally rebound after compression but can be weakened significantly after an impact, meaning they can be less protective as they age



STEEL TOE	COMPOSITE TOE
Made from Steel	Non-metal such as fiberglass or plastics
Used since last 110 years & are very popular	Second to Steel toe due to few benefits
Weight UK 8 around 95 gm.	Around 65 gm.
Naturally stronger than composite toe caps, only 1.6-1.8 mm thick	Lighter compared to a steel toe, but thicker > 8 mm
Sleek as height is less	Bulky as height is at least 8-10 mm more
Magnetic so trigger metal alarm	Non Magnetic so no triggering of metal alarm
Cheaper compared to composite toe work boots	Costlier mostly used in a higher end safety boots
Conducting cold, heat and electricity	Not conducting heat or cold in extreme temperatures
No Memory (Inability to spring back to normal)	Very Good Memory
	Only absolute indication: Frequent flyers

FIBERGLASS toecaps are a great compromise between sturdiness & absence of metal parts. The biggest difference between plastic and fiberglass toe cap is that fiberglass can be thinner than plastic and still pass the impact and compression tests, so the shoe where fiberglass toe caps are used can be a bit smaller and have a lower profile compared to plastic toe ones. They are expensive than composite toecaps but cheaper than aluminum. The average weight is about 75gr.



Some additional details:

- The compression test gives a great result, there is an memory effect, so the toecap doesn't look affected by the impact
- The thermal insulation is good. Great for high or low temperatures
- They are not electricity-conductive

CARBON FIBER toecaps are the best compromise between weight & sturdiness, but they are very expensive hence used in new.

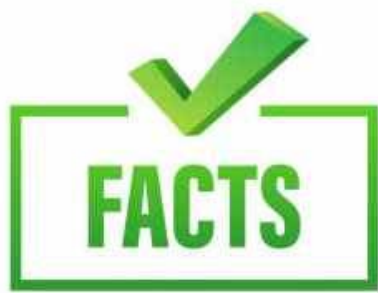
Some additional details:

- Has no resistance to the chain of a chainsaw
- The thermal insulation is good. Great for high or low temperatures
- They are not electricity conductive

Test Requirements As Per EN 12568:2010 Done on Bare Toecaps

PROPERTY TOE CAP	METAL	NON METAL	REQUIREMENT
Finishing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Free from Surface marks /burrs/sharp edges
Internal length	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Min Internal length Size/mm 5/34; 6/36; 7/38;8/39; 9/40; 10/42
Width of flange	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Not greater than 10 mm
Impact resistance Internal Toe	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Size/mm
Compression resistance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6/20; 7/20.5;8/21; 9/21.5; 10/22
Corrosion resistance	<input checked="" type="checkbox"/>		Not more than 3 area none of which more than 2 mm in any direction
Impact resistance after 5 environmental treatments Temp: High 60°C; Low - 20°C Effect of Acid, Alkali & Fuel Oil		<input checked="" type="checkbox"/>	Size/mm 6/20; 7/20.5;8/21; 9/21.5,10/22

In summary, whether you choose composite toe or steel toe boots should depend on job role & safety requirements. They each have their strengths & weaknesses, which is why we manufacture both types.



MYTH THAT COMPOSITE TOE CAP REDUCE WEIGHT OF FOOTWEAR SIGNIFICANTLY:

- ✓ For a person weighing 80 Kg a reduction of less than 100 Gm. in footwear weight should be insignificant.
- ✓ For UK Size 8, Composite toecap (CT) is lighter by 30 Gm. per toecap or 60 Gm. per pair.
- ✓ CT being more than 8 mm thick, forces the use of one size upper & sole. For size 8 footwear upper & sole to be used is of Size 9, increasing leather & PU consumption in sole, negating the 30/60 Gm. advantage offered by lighter composite toecap.
- ✓ In addition, the footwear looks bulky in vamp area due to increased height of the CT.

ABSOLUTE INDICATION FOR USE OF COMPOSITE TOE CAP:

1. Frequent Flyers so as to avoid triggering of metal detectors alarm, but ensure that footwear is non-metallic.
2. Highly Magnetic Environment.
3. Cold Area
4. Hot Area but remember Glass transition point of CT is around 150°C
5. Steel Toecap is not contraindicated in Electrical Hazard Footwear.