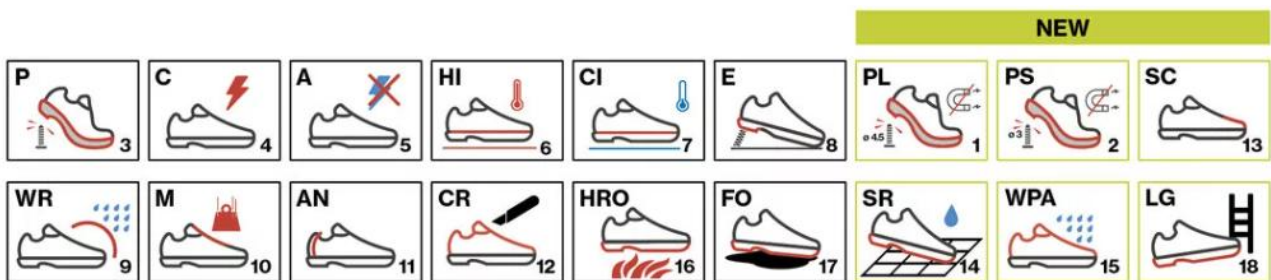




OnSite Support Research Team

# New Safety Footwear Standards: 2024



First published Autumn 2024

This and other White Papers have been developed by the OnSite Support Research Team in collaboration with leading independent bodies and other partners including V12 Footwear and uxev group

**A NUMBER OF CHANGES AND UPDATES HAVE BEEN MADE TO THE SAFETY STANDARDS FOR FOOTWEAR.**

**THIS PAPER WILL GIVE YOU A DETAILED AND THOROUGH GUIDE TO THE NEW CHANGES AND HOW THEY MIGHT IMPACT YOU AND YOUR ORGANISATION.**

**After being in place for over a decade, the safety standards for footwear are changing.**

### **A simple guide to EN ISO 20345:2022 + A1:2024**

Getting to grips with safety standards can be challenging. Even for experienced industry professionals, navigating the wide array of specifications and requirements can rapidly become overwhelming.

The change in the EN standard for safety footwear now threatens to create further confusion for health & safety managers. This guide is designed to demystify the new standard. It provides a straightforward overview of everything you need to know about EN ISO 20345:2022 and what – if anything – you need to do now.

### **Navigating the transition: EN ISO 20345:2011 to EN ISO 20345:2022**

The launch of the new standard EN ISO 20345:2022 for safety footwear which took place in March 2023, introduces enhanced safety specifications for occupational footwear. For manufacturers, the ability to continue production under valid EN ISO 20345:2011 certificates until 11th November 2024 provides a transitional period. After this date, it's important to note, that all existing certificates will expire at their designated date, at which time, safety footwear must be re-tested and certified against the updated requirements of EN ISO 20345:2022.

This transition period, extending up to five years, allows for a gradual integration of the new standard. Customers can therefore expect to encounter safety footwear certified under either the 2011 or 2022 standard until November 2029. Understanding these timelines allows both manufacturers and customers to navigate the shift effectively.

The A1:2024 changes are relatively minor though. The most recent update adds requirements such as no separation of layers during testing for non-metallic perforation inserts (PS type), changes to water absorption and desorption testing with reference to a membrane, and an additional ergonomic test for scuff caps (SC) when worn in a kneeling position. Existing certificates remain valid until their expiry date.

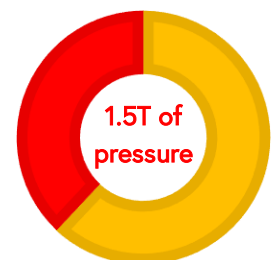
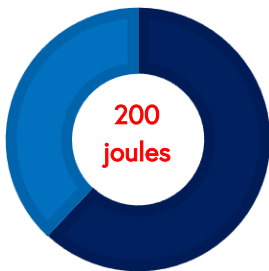
Most of the basic requirements are the same for EN ISO 20345:2011 and EN ISO 20345:2022:

### ***Min. requirements for the toe cap:***

***Drop test at 200 joules of test energy  
(20 kg from a height of approx. 1m)***

***Static pressure test at 15 kilonewtons  
(approx. 1,500 kg of pressure)***

***Slip resistance: added as a basic requirement  
for all safety footwear***



## Background

A number of changes and updates have been made to the safety standards for footwear. Some changes relate to the requirements footwear will need to meet, whereas others refer to the test methods themselves. These changes will also mean that some of the safety markings on footwear will be changed, removed or incorporated into other new standards.

This paper will give you a detailed and thorough guide to the new changes and how they might impact you and your organisation. It is also designed to make what might look like complex and weighty new information clear, jargon-free and easy to prepare for.

## Summary

Some of the new safety footwear standards include:

- Changes to slip-resistance and water-resistance
- New codes and tests in nail penetration
- New ladder grip tests

And you'll be able to see these changes reflected in the way safety boots are labelled - take a look at the following image.



## How will the safety standard changes affect me?

How the changes will affect you will depend on what your role is in relation to safety footwear.

### SUPPLIERS

Suppliers need to be up to speed with changes in the safety coding to support customers who might not be aware of the latest updates. Customers may have old standards in their minimum standards, on tender documents and product catalogues, so it's key to have an understanding of what's changed.

### THOSE RESPONSIBLE FOR FOOTWEAR FOR MY COMPANY

*The change in the EN standard for safety footwear now threatens to create further confusion for health & safety managers.*

Knowing the changes in standards will be vital for specifying and requesting safety footwear from your suppliers, because you'll need to be specific on the right level of protection. Being able to identify inaccuracies in procurement product requests also depend on you getting to know the new standards.

### I BUY MY OWN FOOTWEAR

If you buy your own footwear, knowing the new coding will be key so you can check the level of protection in your work boot. A number of safety markings that have been familiar for years have now been either removed, modified or incorporated into new safety codes, so you need to get to know these changes as soon as possible.



## Navigating the transition: EN ISO 20345:2011 to EN ISO 20345:2022

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For manufacturers, the ability to continue production under valid EN ISO 20345:2011 certificates until 11th November 2024 provides a transitional period. After this date, it's important to note, that all existing certificates will expire at their designated date, at which time, safety footwear must be re-tested and certified against the updated requirements of EN ISO 20345:2022.

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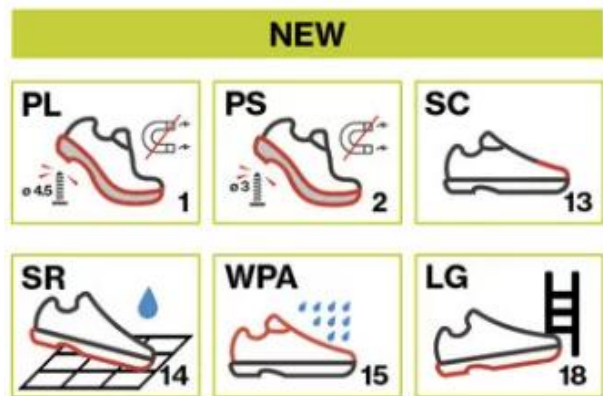
Understanding these timelines allows both manufacturers and customers to navigate the shift effectively.



## Beyond the basic requirements

There are now 18 potential additional requirements, which are as follows:

Codes and requirement for special applications		
	Symbol	Requirement
1	PL	Perforation resistance, non-metallic insert, tested with a 4.5 mm test nail
2	PS	Perforation resistance, non-metallic insert, tested with a 3.0 mm test nail
3	P	Perforation resistance (metal insert)
4	C	Partly conductive footwear
5	A	Anti-static footwear
6	HI	Heat insulation of the sole complex
7	CI	Cold insulation of the sole complex
8	E	Energy absorption of the seat region
9	WR	Water resistance
10	M	Metatarsal protection
11	AN	Ankle protection
12	CR	Cut resistance of the upper part of the shoe
13	SC	Abrasion resistance of optional overcaps
14	SR	Slip resistance on ceramic tile floors with glycerol
15	WPA	Water penetration and absorption
16	HRO	Heat resistance of the outsole
17	FO	Fuel resistance and oil resistance
18	LG	Outsoles provide hold on ladders



*You should aim to buy shoes/boots that meet the new standard if:*

- Workers have suffered accidents caused by their footwear, such as slips and falls
- You carry out a new risk assessment and identify new workplace hazards
- The footwear is subject to wear and tear that affects their protective features

## Key changes:

Under the 2011 standard, the protection levels were divided into six classes: SB, S1, S2, S3, S4 and S5.

Under the new standard, **there are now eight main protection classes:** SB, S1, S2, S3, S4, S5, S6 and S7.

The two new protection classes – S6 and S7 – are used to indicate those with higher water resistance properties in line with the new 'WR' certification (see above section on water resistance). In addition to the new classes, the class codes may also be followed by 'P', 'L' (or 'PL') and 'S' (or 'PS') to indicate additional perforation resistance in line with the 'P', 'PL' and 'PS' certifications.

**Note:** S1, S2, S3, S6 and S7 shoes are made from leather and other materials (class 1). S4 and S5 shoes are all-rubber or all-polymeric (class 2). SB shoes – which allow for an open heel – can be either class 1 or class 2.



## Using the 2022 Safety Footwear Categories:

New safety footwear tested to the 2022 standards will be tested based on the 'S' (safety) categories, so below we've broken down this classification from SB – S7 to highlight the type of application they could be suited to.



**Note:** while the safety standards to which a boot is tested can give you an idea of best-suited application, remember that different areas of safety sectors require different levels of protection. e.g. working in construction in an indoor area might only require an S1 boot, but in other construction roles with more specific hazards such as quarrying, a higher spec S7 boot might be required.

**All safety footwear tested to the 2022 standards will feature the mandatory safety features of:**

- Basic toe protection with a toe cap tested to 200 Joules
- Basic slip resistance

## SB (safety basic)

**Features:** Basic toe protection and slip resistance.

- **Job Roles/Applications:** Ideal for indoor job roles where the hazards are toe impact and a degree of slip resistance is required, such as
- Light Manufacturing
- Warehousing and Logistics.

## S1

**Features:** Toe protection, closed seat region, anti-static properties and energy absorption in the heel.

### Job Roles/Applications:

As SB, but S1 footwear should also come into play if the wearer is standing or walking in their work boots for long periods of time, due to the energy absorption benefit in the heel. Also, because of the anti-static properties of S1, they can also suit job roles such as:

- Construction
- Warehousing and Logistics
- Manufacturing and Maintenance

**Note:** S1 and SB styles may have additional safety features denoted by other symbols. For example, SB-P or S1-P mean the safety footwear has the additional feature of penetration resistance (a midsole).

## S2

**Features:** All the features of S1 plus a water-resistant upper.

**Job Roles/Applications:** Best for roles where occasional water exposure through spills or light showers are likely, including sectors such as:

- Landscaping and Grounds Maintenance
- Logistics and Warehousing (outdoor loading and unloading)
- Cleanroom and Laboratory Settings

## S3

**Features:** All the features of S2 plus a penetration-resistant midsole and cleated outsole (protruding grip).

**Job Roles/Application:** For harsher outdoor environments where there is a risk of sharp objects such as nails, debris or tools penetrating the underfoot as well as water exposure and slip risks, such as sectors including:

- Food and Beverage
- Oil and Gas
- Rail
- Construction
- Heavy Manufacturing
- Agriculture and Farming
- Outdoor Maintenance
- Utilities and Public Works
- Warehousing and Logistics
- Mining and Quarrying

## S4

**Features:** As SB plus a closed heel, anti-static and energy absorption, but made from a rubber upper or entirely moulded polymer, e.g. a Wellington boot, so it offers water and leak-proof properties.

**Job Roles/Applications:** Ideal for environments with high exposure to water and liquids such as work settings that are outdoors or feature wash bays, including:

- Grounds Maintenance
- Chemical Processing
- Agriculture and Estate Management
- Food and Beverage
- Fishing and Marine
- Sewage and Waste Management
- Industrial Cleaning
- Groundworker

## S5

**Features:** All the features of S4 plus a penetration-resistant midsole and cleated outsole.

**Job Roles/Applications:** Best for heavy-duty roles with high risk of water exposure and sharp objects such as:

- Construction
- Agriculture
- Mining and Quarrying
- Highways
- Utilities
- Waste and Recycling



## S6

**Features:** All the features of S2 as well as water resistance for the whole piece of footwear (waterproof).

**Job Roles/Applications:** Suitable for environments where protection against frequent high levels of water is required without underfoot protection, such as:

- Facilities Management
- Cleaning

## S7

**Features:** All the features of S3 (specifically midsole protection) as well as water resistance for the whole piece of footwear (waterproof).

**Job Roles/Applications:** Ideal for environments featuring prolonged cold and wet conditions that also pose underfoot risks through sharp objects, such as:

- Waste and Recycling
- Agriculture
- Highways
- Outdoor Construction
- Rail Repair and Maintenance

	Class	Protective toecap	Mandatory slip resistance	Full enclosed heel	A Electrical resistance	E Energy absorption under the heel	Puncture protection			WPA Water penetration and absorption of upper	Cleated outsole	WR Whole shoe water-resistant
							P Metal insert	PL Non-metal insert 4.5mm test nail	PS Non-metal insert 3.0mm test nail			
	SB	✓	✓									
	S1	✓	✓	✓	✓	✓						
	S1P	✓	✓	✓	✓	✓	✓					
N E W	S1PL	✓	✓	✓	✓	✓		✓				
	S1PS	✓	✓	✓	✓	✓			✓			
	S2	✓	✓	✓	✓	✓			✓			
	S3	✓	✓	✓	✓	✓	✓		✓	✓		
N E W	S3L	✓	✓	✓	✓	✓		✓	✓	✓		
	S3S	✓	✓	✓	✓	✓			✓	✓	✓	
	S4	✓	✓	✓	✓	✓						
	S5	✓	✓	✓	✓	✓	✓				✓	
N E W	S5L	✓	✓	✓	✓	✓		✓			✓	
	S5S	✓	✓	✓	✓	✓			✓		✓	
	S6	✓	✓	✓	✓	✓			✓			✓
	S7	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	S7L	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	S7S	✓	✓	✓	✓	✓			✓	✓	✓	✓

## Details of Changes

### WHAT ARE THE MOST IMPORTANT CHANGES?

While there are several new updates to the footwear safety standards, some of the most significant changes include:

#### NEW SLIP RESISTANCE MARKINGS

The old slip resistance markings of 'SRA', 'SRB' and 'SRC' no longer exist in the new standards. Because slip resistance is such a crucial and almost universal feature of general safety footwear, it is now considered mandatory and therefore will not carry a mark.

There is an option for manufacturers to carry out an additional slip test which, if passed, will allow this footwear to be marketed with an 'SR' symbol.

Slip resistance testing will no longer feature a steel surface – both the mandatory and optional SR tests will be conducted on a ceramic tile surface. However, the contaminant solution will differ:

- The mandatory test will use sodium lauryl sulphate for its lubricant
- The optional 'SR' slip test will feature glycerine for its lubricant

A final change to the slip resistance standard is the area of the footwear to be tested. Rather than the flat of the footwear, the heel and forepart of the boot will now be the area tested.

#### NEW WATER-RESISTANT SYMBOLS

The old symbol of 'WRU' (water-resistant uppers) will be replaced by a new code 'WPA', which stands for water penetration and absorption. The test itself has not changed.

#### SCUFF CAP ABRASION RESISTANCE TEST

This new requirement tests the durability of the scuff cap to establish its capability in protecting the toecap. It will come with the associated symbol 'SC', once footwear has successfully withstood 8,000 abrasion cycles.

#### LADDER GRIP TEST

This new marking code of ladder grip has testing taken from the firefighter standard (EN 15090) and will be denoted by the symbol 'LG'.

#### NEW CODES AND TESTS FOR PUNCTURE RESISTANCE

There will be two test methods for 'NMAPI' (non-metal anti-penetration inserts). The first test for general risks will feature a nail 4.5 millimetres in diameter and will be marked 'PL'. A second test featuring a nail 3 millimetres in diameter will be marked

**NB** This additional test gives more scope to the variety of nails to which a wearer could be exposed.

Manufacturers can choose either of these tests for their products to undergo, which will allow the wearer to choose footwear marked either with a 'PL' or 'PS' and therefore select the type of protection associated with his or her risk. A shoe or boot cannot carry more than one 'P' marking – it will either have 'PL' or 'PS'. If a product uses a steel plate insert, it is simply marked, as per the original standards, with a 'P'.

#### AREA CHANGED FOR ANKLE PROTECTION TEST

In the original test, the same area of the boot was used for the point of impact regardless of its size. However, this amendment means that the area absorbing the impact will change depending on the size of the boot, allowing for more accurate and representative results.

#### A1:2024 CHANGES

The A1:2024 changes are relatively minor though. The most recent update adds requirements such as no separation of layers during testing for non-metallic perforation inserts (PS type), changes to water absorption and desorption testing with reference to a membrane, and an additional ergonomic test for scuff caps (SC) when worn in a kneeling position. Existing certificates remain valid until their expiry date.

# Comparison of Changes

The table shows the old 2011 safety standard test classifications (on the left) compared to the updated 2022 standards (on the right)



Reproduced courtesy of V12 Footwear

MARKING CODES TO DEFINE LEVEL OF PROTECTION PROVIDED: EN ISO 20345:2011		MARKING CODES TO DEFINE LEVEL OF PROTECTION PROVIDED: EN ISO 20345:2022	
Class I	Footwear made from leather and other materials	Class I	Footwear made from leather and other materials
Class II	All entirely moulded footwear	Class II	All entirely moulded footwear
		SBH	HYBRID FOOTWEAR that cannot be classified as Class I or II.
SB	Safety toe oap protection only, tested with 200 J impact and 15 kN compression force.	SB	Safety toe oap protection only, tested with 200 J impact and 15 kN compression force.
SI	Class I + closed heel area + SB + A + E + FO	SI	Class I + closed heel area + SB + A + E
S2	As SI + WRU	S2	As SI + WPA
S3	As S2 + P + oledated outsoles	S3	(Metal insert type P) as S2 + P + oledated outsoles
		S3L	(Non-metal insert type PL) as S2 + PL + oledated outsole
		S3S	(Non-metal insert type PS) as S2 + PS + oledated outsole
S4	Upper material of all-rubber or polymeric as SB + closed heel area + A + E + FO	S4	Upper material of all-rubber or polymeric as SB + closed heel area + A + E
S5	As S4 + P + oledated outsole	S5	(Metal insert type P) as S4 + P + oledated outsole
		S5L	(Non-metal insert type PL) as S4 + PL + oledated outsole
		S5S	(Non-metal insert type PS) as S4 + PS + oledated outsole
		S6	As S2 + WR
		S7	(Metal insert type P) as S3 + WR
		S7L	(Non-metal insert type PL) as S3 + WR
		S7S	(Non-metal insert type PS) as S3 + WR

P	Penetration-resistant outsole: lowest penetration value required shall not be less than 1,100 N	P	(Metal insert type P) Penetration-resistant outsole: Lowest penetration value required shall not be less than 1,100 N
		PL	(Non-metal insert type PL) Penetration-resistant outsole: Lowest penetration value required shall not be less than 1,100 N and no separation of the layers shall occur during all tests.
		PS	(Non-metal insert type PS) Penetration-resistant outsole: Average penetration value shall not be less than 1,100 N with no single value shall be lower than 950 N
A	Anti-static: electrical resistance between foot and ground of between 0.1 and 1,000 mega ohms*	A	Anti-static: electrical resistance between foot and ground of between 0.1 and 1,000 mega ohms*
C	Conductive footwear. The electrical resistance of the footwear shall not be greater than 100 kΩ.	C	Partially conductive footwear. The electrical resistance shall not be greater than 0.1 mega ohms between foot and ground*
CI	Insulation against the cold: 30 minutes at -17°C, the decrease shall not be more than 10°C	CI	Insulation against the cold: 30 minutes at -17°C, the decrease shall not be more than 10°C
HI	Insulation against heat: 30 minutes at 150°C, the rise shall not be higher than 22°C	HI	Insulation against heat: 30 minutes at 150°C, the rise shall not be higher than 22°C
E	Energy absorption of the seat region: energy absorbed to be not less than 20 J	E	Energy absorption of the seat region: energy absorbed to be not less than 20 J
WRU	Water penetration and absorption (water-resistant and breathable)	WPA	Water penetration and absorption (water-resistant and breathable)
AN	Ankle protection: 10 N impact mean transferred force shall not exceed 10 kN and no single value shall exceed 15 kN.	AN	Ankle protection: 10 N impact mean transferred force shall not exceed 10 kN and no single value shall exceed 15 kN.
WR	Water-resistant footwear (waterproof membrane)	WR	Water-resistant footwear (waterproof membrane)
CR	Cut-resistant upper: cut-resistant index to exceed 2.5	CR	Cut-resistant upper: cut-resistant index to exceed 2.5
M	Metatarsal protection 100 J impact energy	M	Metatarsal protection 100 J impact energy
SRA	Slip resistance on ceramic tile floor with sodium lauryl sulphate solution	SR	Slip resistance now seen as mandatory, so no symbol given
SRB	Slip-resistant on steel floor with glycerol	SR	Slip test will feature glycerine on ceramic tile surface
SRC	Slip-resistant for both SRA and SRB	SR	Slip test will feature glycerine on ceramic tile surface
		Ø	No test given – for footwear featuring spikes or studs on sole

A table showing (on the left) the old 2011 safety standard test requirements compared to the updated 2022 standards (on the right)

HRO	Heat-resistant outsole compound: shall withstand 300°C for 60 seconds	HRO	Heat-resistant outsole compound: shall withstand 300°C for 60 seconds
FO	Resistance to fuel oil	FO	Resistance to fuel oil
		LG	Ladder grip
		SC	Soft oap abrasion

A table showing (on the left) the old 2011 safety standard test classifications compared to the updated 2022 standards (on the right)

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## New Markings / Symbols Explained:

**Perforation resistance:** Under the old standard, all safety shoes or boots that offered protection against nail penetration had the marking 'P'. Under the new standard, 'P' is used for metallic soles that have been tested with a 4.5 mm nail. Shoes with non-metallic soles are marked with either 'PL' if tested with a 4.5 mm nail or 'PS' if tested with a 3 mm nail. As smaller diameter nails give a higher pressure, 'PS' offers a higher level of protection.

### Perforation resistance PL



### Perforation resistance PS



**Ladder grip:** The outsole of all safety footwear must have a transverse profile with a height of at least 1.5 mm in the ankle area to provide adequate grip on ladders. Previously, this was included in the standard for footwear intended for firefighters. Now, this has been copied for a standalone additional test for all safety shoes or boots and is signalled with an 'LG' marking.

### Ladder grip LG



**Fuel oil resistance:** The previous standard mandated that all safety footwear other than those with an open heel (SB) offered resistance to fuel oil. The new standard includes resistance to hydrocarbons – indicated by an 'FO' marking – as an additional test for environments in which hazards such as oil and petrol are present.

### Fuel oil resistance FO



**Scuff cap:** An 'SC' marking can be used if an overcap does not develop any holes across its entire thickness when subjected to a Martindale abrasion test of 8,000 cycles.

### Scuff cap SC



**Water resistance:** The EN ISO 20345:2011 standard featured 'WRU' markings for shoes/boots with 'water-resistant uppers'. However, this did not indicate that the footwear was waterproof as the test requirement is, that no more than 3cm<sup>2</sup> of water penetration is allowed. This is because only the upper itself was tested to obtain WRU certification; when the upper is included in a shoe, the shoe as a whole can lose its water-repellent ability because water penetrates into the seams.

reproduced courtesy of uvex safety

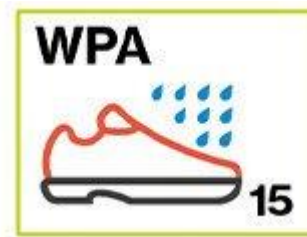
Under the new 2022 standard, WRU has been replaced by WPA. 'WPA' now indicates that footwear can allow for some 'water penetration and absorption'. WPA footwear offers some breathability and can be used in working conditions that do not require the feet to be submerged in water.



Also, under the new 2022 standard the 'WR' (water resistant) marking is the same test for water penetration that is used during the 2011 test, but it is the result that differs. In order to be marked as 'WR' the 2022 standard states no water penetration inside the footwear shall be detected where, as above, the 2011 test allows for 3cm cubed of water to penetrate the footwear and therefore, the new WR standard is more stringent. To help equate one standard to another, a previous S2 model with WR has now become an S6, and a previous S3 model with WR has become an S7.

Often a membrane is used to achieve this however, footwear without a membrane could pass the water resistance testing but the seams would need to be very watertight. The test itself is referred to as "water resistance" and not waterproof, a term often used by wearers. The term "waterproof" would insinuate that the footwear would never allow water to enter, which over time cannot be guaranteed by any manufacturer due to use, wear and tear, also via the tongue and seams of the footwear, depending on depth of water submersion

### Water penetration and absorption WPA



### Water resistance WR



## Conclusion

### *'Safety shouldn't be a mystery'*

This guide to the changes in the standards is intended to ensure people working in hazardous industries have the best chance of being protected by their footwear.



## FAQs

### WHEN DO THE NEW SAFETY STANDARDS 'GO LIVE?'

NOW. The safety standards have already been published. Products that SATRA receives can now be tested to the new standards and carry the new codes.

### IF I HAVE JUST HAD MY SAFETY FOOTWEAR CERTIFIED TO THE OLD 2011 STANDARDS, WILL I NEED TO GET THEM RETESTED?

NO. If you have recently had your safety footwear certified to the old standards, they are still considered valid until the certification is due for renewal, which is five years after the date of this certification.

### CAN FOOTWEAR BE TESTED BEFORE ITS CERTIFICATION IS UP FOR RENEWAL?

YES. Manufacturers do not have to wait until their 2011 safety footwear certification expires. The standards have been published and tests can be conducted as soon as the safety footwear manufacturer wants its products to carry the new codes. There is obviously a cost associated with this, so that may be why some companies will only apply it to new products or when their current certification runs out.

### HOW MUCH TIME DO I HAVE UNTIL THE OLD STANDARDS ARE OFFICIALLY REVOKED?

The 2022 standards have now been harmonised, meaning they have been officially recognised by the European Committee for Standardization. This means the EN ISO 20345:2011 version will be withdrawn from 11th November 2024.

### WHY HAVE THE STANDARDS CHANGED?

The safety standards have changed for a number of reasons. It is hoped that the changes will mean:

- o More precise testing and clearer marking of safety footwear

- o Testing will reflect more realistic or 'real-world' safety conditions

- o More accurate testing to take into account new materials being used in footwear uppers

- o More choice for the organisation and wearer to tailor their footwear to risk. Most crucially though, the overarching purpose of the updates and modifications in the standards is, with thorough testing and clear coding, to reduce workplace injury and continue to keep people as safe as possible at work.

## Acknowledgements

uvex group

Click [here](#) for link to

*[Demystifying the new safety footwear standard](#)*



V12

Click [here](#) for link to

*[Changing Standards for Safety Footwear](#)*

