



Impact of the publication of EN ISO 20345-20346-20347:2022

General

This document presents the impact of the new version of the standard to the certification of your products.

EN ISO 20345 + EN ISO 20346 + EN ISO 20347 is applicable to safety footwear, protective footwear and occupational footwear. They define the requirements, marking and information to user. The test methods are given in the toolbox EN ISO 20344.

The last revision of EN ISO 20345 + EN ISO 20346 + EN ISO 20347 have been published in March 2022. EN ISO 20344 has been published in November 2021.

From a standardization point of view and for the CEN, the old revisions issued in 2011 will be deleted in March 2023.

Up to now, only the publications of 2011 give the presumption of conformity as they are the only revisions published in the Official Journal of the European Union.

However, we will start to certify footwear with the last publications of 2022 since May 2022.

What will happened for existing certificates?

The new revisions of 2022 do not imply to revise the existing certificates which remain valid until their expiry dates.

What are the manufacturer's responsibilities?

It is the responsibility of the manufacturers to ensure their PPE remain in conformity with the state of art. Therefore, the manufacturer has to verify independently whether their productions stay in conformity with the applicable requirements, as for example REACH requirements.

What is new?

Although much of these standards remains unchanged, there are a few changes to consider detailed here after:

New definitions

- seat region becomes heel area
- scuff cap: abrasion resistant material or component to protect against scuff of the upper external toe region during kneeling activities
- conductive footwear becomes partially conductive footwear
- customized safety footwear: individual customized footwear and other specific conditions of a foot, including 3 types:
 - o type 1 = equipped with customized insoles
 - o type 2 = modified safety footwear
 - o type 3 = bespoke safety footwear
- Hybrid footwear becomes a third classification of footwear, including 2 constructions:
 - o hybrid "moulded" footwear: vulcanized rubber or all moulded polymeric foot section integrally moulded around the toecap and often including the outsole, which can be unlined and usually does not incorporate an insole
 - o hybrid "mounted" footwear: vulcanized rubber or all moulded polymeric foot section that is manufactured separately and then constructed around a conventionally lasted lining/insole construction and often with a separately attached outsole

Classification and design

The only difference is that hybrid footwear becomes a new footwear classification:

Classification	Description
Class I	Footwear made from leather and other materials, excluding all-rubber or all-polymeric footwear
Class II	All-polymeric (i.e. entirely moulded) including all-rubber (i.e. entirely vulcanized) foot-wear
Hybrid footwear	Hybrid "moulded" footwear or hybrid "mounted" footwear

Slip resistance:

Old test reports are not acceptable.

New test method:

- The steel plate has been replaced by the ceramic plate for more consistent results
- The test in flat position has been superseded by a forepart position and backward movement

The old SRA requirement becomes a basic requirement without specific marking symbol.

The old SRB requirement becomes an additional requirement. And, as written just before, the testing condition changes: the steel plate is replaced by the ceramic plate. This additional requirement shall be marked on the footwear with the specific marking symbol "SR".



A summary of the differences between the old version and the new standard is given in the following two tables:

Version 2011	Marking	SRA		SRB	
	Surface	Ceramic		Steel	
	Lubricant	NaLS		Glycerine	
	Position	Heel	Flat	Heel	Flat
	Direction	Forward	Forward	Forward	Forward
	Requirement	0,28	0,32	0,13	0,18



Version 2022	Marking	Basic requirement		Additional requirement SR	
	Surface	Ceramic		Ceramic	
	Lubricant	NaLS		Glycerine	
	Position	Heel	Forepart	Heel	Forepart
	Direction	Forward	Backward	Forward	Backward
	Requirement	0,31	0,36	0,19	0,22

The slip resistance basic requirements do not apply to shoes designed for particular purposes, equipped with spikes, metal studs or similar elements, and intended for very specific workplaces (soft floors, for example: sand, mud, undergrowth, etc.). In addition, this type of shoe must be marked with the symbol "Ø".

Width of toecap flange

The new 2 requirements have been added:

- for metallic toecap: the width of the flange shall be not greater than 12 mm
- for non-metallic toecap: the width of the flange shall be not greater than 15 mm

Old test reports are acceptable.

Behaviour of the toecaps (thermal and chemical):

In order to verify the behaviour, the reference standards become:

- EN ISO 22568-1 (Requirements and test methods for the evaluation of footwear components - Part 1 metal toe caps),
- EN ISO 22568-2 (Requirements and methods for tests for the evaluation of footwear components - Part 2 non-metallic toe caps).

For non-metallic toecaps, the conditioning (thermal and chemical) that must be carried out before the impact tests to check their behaviour has changed:

- The conditionings with acid and base have been removed.
- The conditioning at high temperature is more severe. Indeed, the toecaps must be conditioned for 168 hours at 70°C then for 18 hours at 45°C before carrying out the impact instead of 4 hours at 60°C then 18 hours at 45°C.

For non-metallic toecaps, the old test reports are not acceptable.



Behaviour of anti-perforation inserts

The new version of the standard now refers to:

- EN ISO 22568-3 (Requirements and test methods for the evaluation of footwear components - Part 3 Metal anti-perforation inserts)
- EN ISO 22568-4 (Requirements and test methods for the evaluation of footwear components - Part 4 Non-metallic anti-perforation inserts)

For non-metallic inserts, the verification of their thermal and chemical behaviour has changed:

- Tests after cold conditioning have been deleted.
- Chemical tests are now carried out after conditioning with synthetic sweats (acid sweat at pH 5.5 instead of sulfuric acid at 1 mol/l and basic sweat at pH 8.0 instead of sodium hydroxide at 1 mol/l).

For non-metallic inserts, the old test reports are not acceptable.

Upper water vapor permeability:

The new version introduces a limitation of the presence of non-permeable materials in the upper. This limitation is set at a maximum of 25% of the total surface of the upper (excluding toecap area, excluding stiffener/counter area and up to the height of upper given in table 4 of EN ISO 20345). This new limitation is different from the one defined in the old RfU.10.164.

For footwear without or incorporating up to 10 % of non-permeable upper material, the requirements do not change: $WVC \geq 0.8 \text{ mg}/(\text{cm}^2.\text{h})$ and $WVP \geq 15 \text{ mg}/\text{cm}^2$.

In addition, for footwear incorporating between 10 % to 25% max, the water vapor permeability (WVP) of permeable materials shall be greater than or equal to $2.0 \text{ mg}/(\text{cm}^2.\text{h})$.

Abrasion resistance of insole:

The way how to carry out the test itself remains identical to the previous version. But, the way to evaluate the compliance fully changes. Before, the laboratory compared the test pieces to a reference standard. Now, the resistance is in relation with a loss of thickness expressed in %. the final thickness shall not be less than 66% of the initial thickness.

Old test reports are not acceptable.

Ankle protection:

The test method remains the same. The previous requirements are also maintained.

However, the dimensions of the protections are now defined. They must correspond at least to the circular sizes given in the table below:

Size	Minimum diameter in mm
≤ 40	55
41 à 43	60
≥ 44	65

Also, the positioning of the protection is checked during the dimension verification.

The other point to note about this feature is that the protection on the inner face is now optional.

The old test reports are acceptable but the dimensions shall be re-assessed.



Thickness of outsoles with cavities (for mounted assemblies):

A new value has been defined; this is the value d_4 . It designates the thickness of the material of the sole with cavities. It must in no case be less than 2.0 mm.



Water resistance for the whole footwear (WR):

The requirement for this test has become more stringent. In the previous version, there was a tolerance on the water penetration (max 3 cm²). Now, with the new version, no water penetration should be observed.

Old test reports are acceptable only if they show that no penetration occurred.

Perforation resistance (P / PL / PS):

For extreme environments only, it is proposed to carry out a perforation test with a test nail of a diameter smaller than that usually used. For this test, the shape of the test nail remains the same except for its diameter which changes from 4.5 mm to 3.0 mm.

The test is slightly different from that proposed with the classic test nail (PL type) because it consists of determining the maximum force until the sole is completely perforated.

Compliance will be checked if the average value of the recorded values is not less than 1100 N and if none of the individual values is less than 950 N.

The marking associated with this property will be the symbol "PS".

Note that this symbol only concerns shoes with non-metallic perforation-resistant inserts and that it must be differentiated from the "PL" symbol used for shoes with non-metallic perforation-resistant inserts that satisfy the tests carried out with the current 4.5 mm diameter test nail.

Finally, shoes with metallic perforation-resistant inserts claiming puncture resistance retain the "P" symbol.

Old test reports are acceptable for P and PL perforation resistance.

New construction requirements applicable to non-metallic inserts:

Non-metallic inserts incorporated as a layer into the outsole shall not be skived at all.

Non-metallic inserts that also function as an insole:

- may lie above the flange of the safety toecap;
- shall not be skived apart from the following exception: they may be skived where they are covering the toecap flange, maintaining a minimum thickness of 2 mm in the skived area.

Abrasion resistance of the external toecap reinforcements - scuff cap (SC):

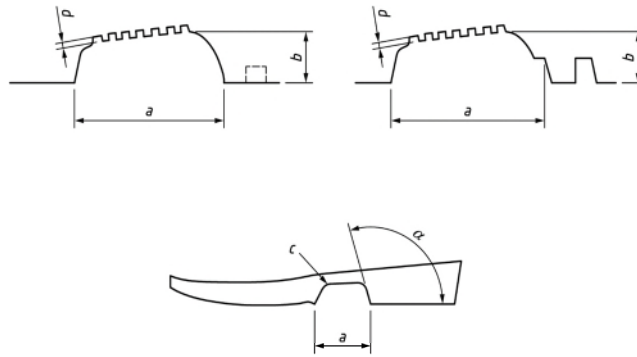
In the previous version of the standard, it was indicated that if an external reinforcement, intended to improve resistance to scuffing in the toe area, was present, then its thickness should be greater than 1.0 mm. In 2022, this requirement has been replaced by a real abrasion resistance test. This test, identical to that carried out for protective gloves in accordance with standard EN 388 (§ 6.1) consists of checking that no through hole occurs on the reinforcement material after 8000 cycles carried out on a Martindale-type device with a 180 grit sandpaper and 9 kPa pressure.

The symbol "SC" must be affixed to the safety shoe in addition to the other markings.



Ladder grip (LG):

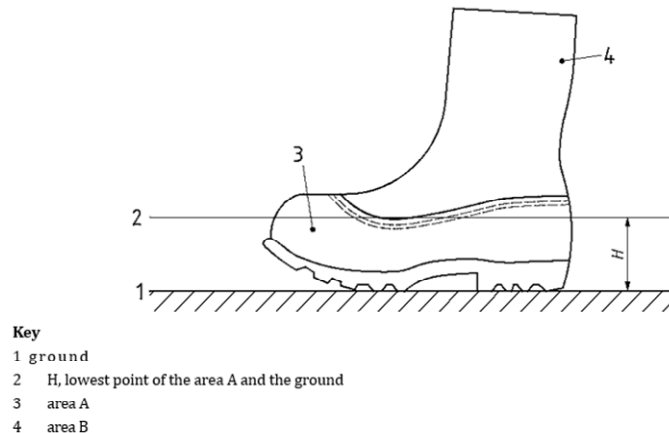
This optional feature is new. It's a copy of the requirements given in the standard EN 15090 – Footwear for firefighters.



The symbol "LG" must be affixed to the safety shoe in addition to the other markings

Seams strength of hybrid footwear upper:

This requirement is new. It applies only to hybrid footwear.



The materials of area A and B may be connected by stitching, welding or other suitable methods. When tested according to ISO 20344:2021, 5.25 the connection shall fulfil a strength of at least 10 N/mm.

Metatarsal protection (M):

In addition to the already existing requirements, the new edition of the standards EN ISO 20345 and EN ISO 20346 requires that the metatarsal protective device comes over the toecap: "The metatarsal protective device shall be such that, under impact, the resulting forces are distributed over the outsole, the toecap and as large a surface of the foot as possible."

New Markings

Marking categories

Standard	Category	Class	Description
20345	SB	Class I	All basic requirement included the slip resistance ceramic/NaLS
	S1	Class I	= SB plus Closed heel area Energy absorption of seat region Antistatic
	S2	Class I	= S1 plus Water penetration and absorption
	S3 (metal insert type P) S3L (non-metal insert type PL) S3S (non-metal insert type PS)	Class I	= S2 plus: Perforation resistance according to the type Cleated outsole
	S4	Class II	= SB plus Closed heel area Energy absorption of seat region Antistatic
	S5 (metal insert type P) S5L (non-metal insert type PL) S5S (non-metal insert type PS)	Class II	= S4 plus: Perforation resistance according to the type Cleated outsole
	S6	Class I	= S2 plus: Water resistance of the whole footwear
	S7 (metal insert type P) or S7L (non-metal insert type PL) S7S (non-metal insert type PS)	Class I	= S3 plus Water resistance of the whole footwear

Standard	Category	Class	Description
20346	PB		All basic requirement included the slip resistance ceramic/NaLS
	P1		= PB plus Closed heel area Energy absorption of seat region Antistatic
	P2		= P1 plus Water penetration and absorption
	P3 (metal insert type P) P3L (non-metal insert type PL) P3S (non-metal insert type PS)	Class I	= P2 plus: Perforation resistance according to the type Cleated outsole
	P4	Class II	= PB plus Closed heel area Energy absorption of seat region Antistatic
	P5 (metal insert type P) P5L (non-metal insert type PL) P5S (non-metal insert type PS)	Class II	= P4 plus: Perforation resistance according to the type Cleated outsole
	P6	Class I	= P2 plus: Water resistance of the whole footwear
	P7 (metal insert type P) or P7L (non-metal insert type PL) P7S (non-metal insert type PS)	Class I	= P3 plus Water resistance of the whole footwear



Standard	Category	Class	Description
20347	OB		All basic requirement included the slip resistance ceramic/NaLS
	O1		= OB plus Closed heel area Energy absorption of seat region Antistatic
	O2		= O1 plus Water penetration and absorption
	O3 (metal insert type P) O3L (non-metal insert type PL) O3S (non-metal insert type PS)	Class I	= O2 plus: Perforation resistance according to the type Cleated outsole
	O4	Class II	= OB plus Closed heel area Energy absorption of seat region Antistatic
	O5 (metal insert type P) O5L (non-metal insert type PL) O5S (non-metal insert type PS)	Class II	= O4 plus: Perforation resistance according to the type Cleated outsole
	O6	Class I	= O2 plus: Water resistance of the whole footwear

Additional requirements with appropriate symbols for marking:

Requirement	Symbol	
Whole footwear	Perforation resistance (metal insert type P) Perforation resistance (non-metal insert) - Type PL - Type PS	P PL PS
	Electrical properties - partially conductive footwear - antistatic footwear	C A
	Resistance to inimical environments: - Heat insulation of outsole complex - Cold insulation of outsole complex	HI CI
	Energy absorption of seat region	E
	Water resistance	WR
	Metatarsal protection	M
	Ankle protection	AN
	Cut resistance	CR
	Scuff cap abrasion	SC
	Slip resistance (on ceramic tile floor with glycerine)	SR
Upper	Water penetration and absorption (supersedes WRU)	WPA
Outsole	Resistance to hot contact Resistance to fuel oil Ladder Grip	HRO FO LG



Information to supply (User instructions)

All information shall be unambiguous and shall include the following.

- a) Name and full address of the manufacturer;
- b) Reference to this document, i.e. EN ISO 20345:2022;
- c) Explanation of any graphical symbols, markings or levels of performance, if applicable;
- d) Basic explanation of the tests that have been applied to the footwear, if applicable;
- e) Instructions for use:
 - 1) tests to be carried out by the wearer before use, if required;
 - 2) fitting and how to put on and take off the footwear, if relevant (e.g. use of heel strap or mechanical closing systems);
 - 3) application (basic information on possible uses and, where detailed information is given, the source);
 - 4) limitations of use (e.g. temperature range);
 - 5) instructions for storage and maintenance, with maximum periods between maintenance checks (if important, drying procedures to be defined);
 - 6) instructions for cleaning and/or decontamination;
 - 7) obsolescence deadline or period of obsolescence;
 - 8) if appropriate, warnings against problems likely to be encountered during use
 - 9) a warning, that the footwear shall not be modified, except for orthopaedic adaptations according to Annex A;
 - 10) if helpful, additional illustrations, part numbers, etc.
- f) Reference to accessories and spare parts, if relevant (e.g. recommended socks);
- g) Type of packaging suitable for transport, if relevant.

Useful information for the user are explained in Annex B and C

Partially conductive footwear

Additional information shall be given regarding partially conductive properties when claimed:

“Electrically partially conductive footwear should be used if it is necessary to minimize electrostatic charges in the shortest possible time, e.g. when handling explosives. Electrically partially conductive footwear should not be used, if the risk of shock from any electrical apparatus or live parts with AC or DC voltages has not been completely eliminated. In order to ensure that this footwear is partially conductive, it has been specified to have an upper limit of resistance of 100 kΩ in its new state.

During service, the electrical resistance of footwear made from conducting material can change significantly due to flexing and contamination, and it is necessary to ensure, that the product is capable of fulfilling its designed function of dissipating electrostatic charges during its entire life. Where necessary, it is therefore recommended, that the user establish an in-house test for electrical resistance and use it at regular intervals. This test and those mentioned below should be a routine part of the accident prevention program at the workplace.

If the footwear is worn in conditions where the soling material becomes contaminated with substances that can increase the electrical resistance of the footwear, wearers should always check the electrical properties of their footwear before entering a hazard area.

It is recommended to use an electrical dissipative sock.

Where partially conductive footwear is in use, the resistance of the flooring should be such that it does not invalidate the protection provided by the footwear. In use, no insulating elements



should be introduced between the inner sole of the footwear and the foot of the wearer. If an insert (i.e. insocks, socks) is put between the inner sole and the foot the combination footwear/insert should be checked for its electrical properties.”

Antistatic footwear

Additional information shall be given regarding antistatic properties:

“Antistatic footwear should be used if it is necessary to minimize electrostatic build-up by dissipating electrostatic charges, thus avoiding the risk of spark ignition of, for example, flammable substances and vapours, and if the risk of electric shock from mains voltage equipment cannot be completely eliminated from the workplace. Antistatic footwear introduces a resistance between the foot and ground but may not offer complete protection. Antistatic footwear is not suitable for work on live electrical installations. It should be noted, however, that antistatic footwear cannot guarantee adequate protection against electric shock from a static discharge as it only introduces a resistance between foot and floor. If the risk of static discharge electric shock, has not been completely eliminated, additional measures to avoid this risk are essential. Such measures, as well as the additional tests mentioned below, should be a routine part of the accident prevention programme at the workplace.

Antistatic footwear will not provide protection against electric shock from AC or DC voltages. If the risk of being exposed to any AC or DC voltage exists, then electrical insulating footwear shall be used to protect from against serious injury.

The electrical resistance of antistatic footwear can be changed significantly by flexing, contamination or moisture. This footwear might not perform its intended function if worn in wet conditions.

Class I footwear can absorb moisture and can become conductive if worn for prolonged periods in moist and wet conditions. Class II footwear is resistant to moist and wet conditions and should be used is if the risk of exposure exists.

If the footwear is worn in conditions where the soling material becomes contaminated, wearers should always check the antistatic properties of the footwear before entering a hazard area.

Where antistatic footwear is in use, the resistance of the flooring should be such that it does not invalidate the protection provided by the footwear.”

It is recommended to use an antistatic sock.

“It is, therefore, necessary to ensure, that the combination of the footwear its wearers and their environment is capable, to fulfil the designed function of dissipating electrostatic charges, and of giving some protection during its entire life. Thus, it is recommended, that the user establish an in-house test for electrical resistance, which is carried out at regular and frequent intervals.”

Insocks

If the footwear is supplied with a removable insock, it should be made clear in the leaflet that testing was carried out with the insock in place. A warning shall be given that the footwear shall only be used with the insock in place and that the insock shall only be replaced by a comparable insock supplied by the original footwear manufacturer or supplied by an insocks manufacturer which will supply insocks that fulfil the properties of this standard in combination with the foreseen safety footwear.

If the footwear is supplied without an insock, it should be made clear in the leaflet that testing was carried out with no insock present. A warning shall be given that only insocks that fulfil the properties of this standard in combination with the identified safety footwear can be fitted.



Perforation resistance

Additional information shall be given regarding perforation resistance:

“The perforation resistance of this footwear has been measured in the laboratory using standardized nails and forces. Nails of smaller diameter and higher static or dynamic loads will increase the risk of perforation occurring. In such circumstances, additional preventative measures should be considered. Three generic types of perforation resistant inserts are currently available in PPE footwear. These are metal types and those from non-metal materials, which shall be chosen on basis of a job-related risk assessment. All types give protection against perforation risks, but each has different additional advantages or disadvantages including the following:

Metal (e.g. S1P, S3): Is less affected by the shape of the sharp object/hazard (i.e. diameter, geometry, sharpness) but due to shoemaking techniques may not cover the entire lower area of the foot.

Non-metal (PS or PL or category e.g. S1PS, S3L): May be lighter, more flexible and provide greater coverage area, but the perforation resistance may vary more depending on the shape of the sharp object/hazard (i.e. diameter, geometry, sharpness). Two types in terms of the protection afforded are available. Type PS may offer more appropriate protection from smaller diameter objects than type PL.

Date of obsolescence

The obsolescence date of footwear during storage before use depends on the effects of time, environment and has to be stated by the manufacturer.

It is the responsibility of the manufacturer to determine all factors, which can influence the time of use and/or foreseen protection (e.g. UV radiation, heat, cold, water, salt, temporal factors of material properties ...)

The obsolescence dates should be proven by supporting evidence (tests, experience). The manufacturer cannot predict the obsolescence date during use.



If you want to, how to update your existing certificates to the revisions 2022

Ask your usual contact at CTC CE marking team. He will help you during all the process.

For updating your existing certificates, we will have to evaluate if the footwear meets the requirements of the 2022 edition.

All test reports supporting the conformity to the ERHS of the PPE regulation shall not have been issued more than 5 years at the time of your request, and three years for safety requirements.

Here below, the cases for which testing will be required:

- If old test reports for safety requirements are older than 3 years.
- If old test reports for other requirements than safety are older than 5 years.
- The slip resistance shall be assessed in all cases (at least NaLS on ceramic tile floor).
- If the footwear has a non-metallic toecap, the behaviour (thermal and chemical) shall be assessed.
- If the upper incorporates non-permeable materials, the measurement of the surface will be required.
- If no insock or removable insock, the abrasion resistance of insole shall be assessed.
- If the outsole has cavities, the thickness of the outsole shall be assessed.
- If the footwear has a metallic perforation-resistant insert, and if the outsole is not rigid, then the flexing resistance of outsole shall be assessed.
- If the footwear has a non-metallic perforation-resistant insert, the behaviour (thermal and chemical) and the construction shall be assessed.
- If ankle protection is claimed, the dimensions shall be assessed.
- If metatarsal protection is claimed, the construction shall be assessed
- If abrasion resistance of the scuff cap is claimed, the reinforcement material shall be assessed.
- If water resistance of the whole footwear is claimed, the test shall be performed except if the old test report supports that there is no penetration.
- If the shoe is a hybrid footwear.

For further detail see the table in the next page.

To include all the changes, we have updated our questionnaires for footwear. They are available upon request.



Tests required for the transfer from revision 2011 to revision 2022

		Non-permeable upper material	Slip resistance	Non-metallic toecap	Non-metallic perforation-resistant insert	Metallic perforation-resistant insert	If no insock or removable insock	If ankle protection claimed	If outsole has cavities	Water resistance if claimed	Scuff cap if claimed	Hybrid footwear	Metatarsal if claimed
BASIC REQUIREMENTS													
Whole footwear	5.3.1.2 Upper/outsole adhesion (except stitched sole)											if mounted	
	5.3.2.5 Behaviour of non-metallic toe cap (22568-2)			X									
	5.3.5.2 Slip resistance on ceramic/NaLS (heel>0.31 / forepart>0.36)		X										
	5.3.7 Seam strength of hybrid upper materials (areas A and B)											X	
Upper	Area for non-water permeable materials (ISO 20344 §6.2.3)	X											
	5.4.6 Water vapour permeability (0.8 mg/cm ² /h) and coefficient (15 mg/cm ²) if non wvp material <10%	X											
	5.4.6 Water vapour permeability (2.0 mg/cm ² /h) and coefficient (15 mg/cm ²) if non wvp material >10% and <25%	X											
Insole	5.7.4.1 Abrasion (non leather) - (final thickness >= 66% of the initial thickness)						X						
Outsole	5.8.2.1 Thickness (cleated or non-cleated outsole)								X				
	5.8.5 Rigidity / Flexing resistance					if not rigid							
ADDITIONAL REQUIREMENTS													
Whole footwear	6.2.1.4.3 Behaviour of non-metallic insert (§ 5.3.2 to 5.3.5 of ISO 22568-4)				X								
	6.2.1.2 Construction of perforation-resistant insert				X								
	6.2.5 Water resistance (WR)									X		X	
	6.2.6.1 Metatarsal construction (M)												X
	6.2.7 Ankle protection (AN)								Dimensions only				
	6.2.9 Scuff cap abrasion										X		
	6.2.10 Slip resistance on ceramic/glycerine (heel>0.19 / forepart>0.22)		if SRB/SRC										