Richard Turner, deputy chief executive of SATRA, chairs the CEN TC 161 main committee and the ISO TC94/SC3 committee which together are responsible for the new standards for safety footwear. Here he explains the implications of the latest legislation.

Safety footwear standards update

New standards in footwear satety assess slip resistance, toecap strength and even chain saw protection.

The European and International standards for safety footwear published in 2004 have found widespread acceptance and usage, both within the EU and more globally. Known as the 20344 series, these documents cover first test methods and then performance requirements for footwear with different levels of toe protection, including shoes without a protective cap.

These standards replace EN 344 and EN 345 and their various amendments and, for CE marking purposes, the presumption of conformity associated with these old standards has effectively been transferred to EN ISO 20345, 6 and 7. All new footwear styles CE marked for the EU market after August 2005 should have been assessed against the new requirements.

Being dual EU (CEN) and ISO methods also means that countries as far afield as Australia, South Africa and Brazil have, or are considering, adoption of these standards for their own markets. The major exception is the USA and Canada, which have opted for ASTM and CSA standards respectively.

Moreover, the committees responsible for these new standards (CEN TC161 and ISO TC94/SC3) have not been resting on their laurels, and several other safety footwear related standards have also been published, with more in the pipeline.

Resistance to chainsaw cutting

Published in January 2004 for implementation within the EU no later than March 2005, this standard, EN 17249, has also been adopted by ISO. It brings together the test methods in EN ISO 20344 and EN 381 part 3 with the requirements in EN ISO 20345. It excludes certain upper designs (only designs C, D and E from 20345 are allowed with minimum height requirements for design C) and 200 Joule caps are mandatory. In addition to the chain speeds given in EN 381, a fourth level at 32 m/s has been added, largely to cater for those chainsaws in common usage that are now faster, more powerful and with longer guide bars (longer chains) compared to when the original requirements were laid down over a decade ago.

Chainsaw testing has been developed to study resistance against increasingly powerful chainsaws. The safety boot above is being assessed for slip resistance on a ceramic tile.

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Since EN ISO 20345 is called up, the 2004 version of EN ISO 17249 required the soles of compliant footwear to be oil resistant. However, several Scandinavian countries, notably Finland and Sweden, pointed out that in cold climates (sub-zero winter conditions) it was easier to achieve good slip resistance with soling materials that would not meet the oil resistance requirements expected for EN ISO 20345 footwear. Good grip was considered the more important property.

Firefighters' footwear

Originally covered by EN 345 part 2, the subject of appropriate standards for firemen's boots has been a contentious one. Originally, both CEN and ISO began work on a joint standard but it became clear that European requirements were not always the same as those demanded elsewhere in the world. Since CEN standards must be published in the 28 CEN member states (taking precedence over national standards covering the same topic) and, in this case, are used to support a mandated Directive, it was decided to produce separate EN and ISO documents.

The CEN standard was published in mid-2006 as EN 15090. It draws on EN ISO 20344 and 20345 and adds in requirements for key properties such as resistance to radiant heat and flame. The standard also addresses the issue of insulation against heat and has introduced marking symbols (HI1 HI2 or HI3) to denote to the user the level of protection offered.

Footwear compliant with EN 15090 is also categorised into one of three types. Broadly speaking, Type 1 is intended for general purpose rescue and firefighting on grassland or in forests. Type 2 is suitable for fire rescue situations, including those involving vehicles, whilst Type 3 boots are aimed at situations where hazardous materials are present (for example chemical spills).

New tests (for example flame resistance) have been developed largely as the result of a project funded by the EU which involved most of the leading European Notified Bodies dealing with footwear.

Slip resistance

Although acknowledged as a key safety attribute (slips and trips still cause more industrial accidents than any other single cause), it has been difficult to reach consensus on the best method to use for measuring the slip properties of safety footwear soles.

A provisional method was proposed as ENV 13287:2002 (ENVs are just experimental methods for consideration by CEN countries but without the weight of a full EN). This was then refined and finally published as EN 13287 in March 2004. The procedure is similar in many ways to the well known SATRA test for slip resistance – SATRA TM144.

The method defines two key flooring surfaces (steel and a pressed ceramic tile) and two contaminants (glycerol and water containing the wetting agent sodium lauryl sulphate or NaLS) as well as three slip modes. Other surfaces can of course be used outside the official method (SATRA, for example, also tests on ice) and test conditions are varied according to the size of the footwear (a higher downwards force is applied to bigger sizes).

EN ISO 20344 is in the process of being amended to call up EN 13287 as the harmonised European method for slip resistance. The same text has also been published as ISO 13287 (but not yet amalgamated into an EN ISO – although this should happen shortly). This is the first time that we have had an internationally agreed method for the slip resistance of safety footwear.

The process of amending the performance requirements in EN ISO 20345, 6 and 7 is also underway, with proposed values for coefficient of friction on the ceramic tile with NaLS of 0.28 and 0.32, and on steel with glycerol of 0.13 and 0.18.

The CEN member countries

- Austria
- Belgium
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Iceland
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- The Netherlands
- Norway
- Poland
- Portugal
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- United Kingdom

Testing so far carried out at SATRA suggests that, whilst challenging, these values are quite achievable and overall should lead to safer (less slippery) footwear reaching the European market. So far, ISO 13287 has not been incorporated into other standards, for instance in North America.

Toe caps and penetration resistant inserts

Although covered by the EN ISO 20344/5 series, these components have for some time had their own standard, namely EN 12568:1998. However, developments have seen non-metallic caps – usually hard, stiff polymers often reinforced with textile, rather like GRP (glass reinforced plastic) – become more popular, especially where weight is an issue or for situations where steel might cause problems, for example in workplace environments where metal detectors are employed for security reasons. Aluminium caps are now being used more widely.

Heavyweight textile composites are also now popular replacements for steel mid-soles to give a degree of pierce or puncture resistance to the shoe bottom. These materials lend themselves to the sewn-in sock type of construction (also known as Stoblel stitched) and have the potential to provide a greater area of underfoot protection than their steel counterparts.

However, these non-metallic components present challenges in the way they are assessed since they behave differently, both in the standard tests and in wear, to items made from steel. For example, on impact steel caps will usually permanently deform, whereas a plastic cap might spring back to shape but suffer cracking – meaning that it appears undamaged but could possibly fail badly should it suffer a second, similar, impact. The wearer might be led into a false sense of security.

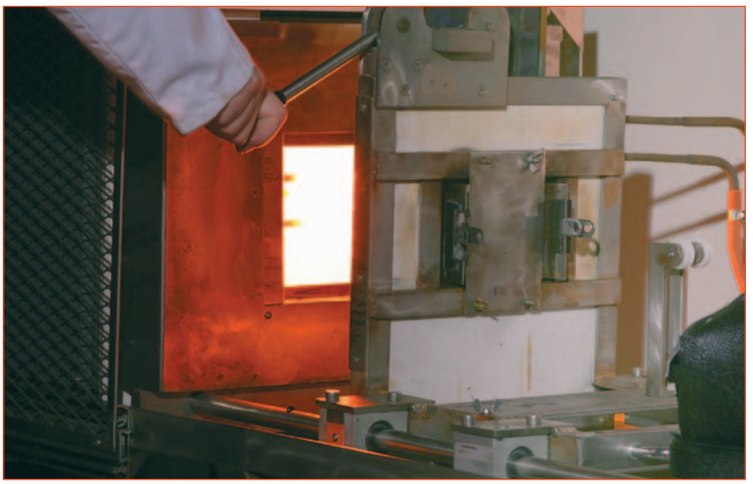
EN 12568 is also therefore being revised to reflect the changes that have taken place. Different methods of assessing non-metallic caps and inserts are also being considered for EN ISO 20344 with possibly new requirements in EN ISO 20345.

Motorcyle footwear

This standard, EN 13634:2002, is currently subject to a five-yearly revision and work on any amendments will begin shortly.

Chemical resistant footwear

A new standard in three parts is currently being progressed and has already been approved by the CEN consultant (a key step in getting any PPE-related standard published). The three parts cover terminology and test methods and requirements for various levels of protection against specific groups of chemicals (footwear must resist at least three of the chemicals listed but can, of course, be tested against any others of relevance to the end use application).



Testing against radiant heat - a sample of material is placed behind the metal cover to the right of the equipment and exposed to radiant heat released on the left.

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Other developments

Committee TC161 is currently considering a possible standard for footwear intended for use in the food industry, as well as further improvements to the EN ISO 20344 series of standards. Areas under discussion include improved methods to assess whole shoe water penetration resistance and flex crack resistance of solings. A new standard for foundry boots is also on the TC161 work programme.

PPE Footwear Standards

EN ISO 20344:2004	Personal protective equipment – test methods for footwear
EN ISO 20345:2004	PPE – safety footwear
EN ISO 20346:2004	PPE – protective footwear
EN ISO 20347:2004	PPE – occupational footwear
All four standards currently subject to possible amendment on slip	
EN 13287:2004 (+ ISO 13287:2006	PPE – (footwear) test method for slip resistance
EN 12568:1998	Foot and leg protectors – requirements and test methods for toecaps and metal penetration resistant inserts
EN 15090:2006	Footwear for firefighters
EN ISO 17249:2004 (amended 2006)	Safety footwear with resistance to chain saw cutting (see also EN 381-3 for test methods)
prEN 13832 parts 1, 2 & 3	Dealing with aspects of chemically resistant footwear
ASTM F2412 and F2413	Which effectively replace ANSI Z-41