

7. Discrepancy between real risks and standardised test methods and specifications - the typical case of safety footwear

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7.1. Background

PPE fulfilling the provisions of PPE Directive 89/686/EEC are considered to be safe. In general, the use of harmonized standards is considered to give presumption of conformity with the basic health and safety requirements and to facilitate the fulfilment of the requirements stated in the PPE Directive. However, a harmonized standard does not necessarily verify all applicable basic health and safety requirements. Also, the standardized test methods and specifications may be contradictory with the provisions of the PPE Directive.

In the case of professional footwear the European standards have recently been renewed. Following new standards have already been published or are still under preparation:

- EN ISO 20344:2004, Personal protective equipment - Test methods for footwear
- EN ISO 20345:2004, Personal protective equipment - Safety footwear
- EN ISO 20346:2004, Personal protective equipment - Protective footwear
- EN ISO 20347:2004, Personal protective equipment - Occupational footwear
- EN 13287:2004, Personal protective equipment - Footwear - Test method for slip resistance
- Specific job related footwear:
 - Footwear for fire-fighters (prEN 15090:2004)
 - Footwear with resistance to chain saw cutting (EN ISO 17249:2004)
 - Footwear protecting against chemicals (prEN 13832-1:2004 - 13832-3:2004)

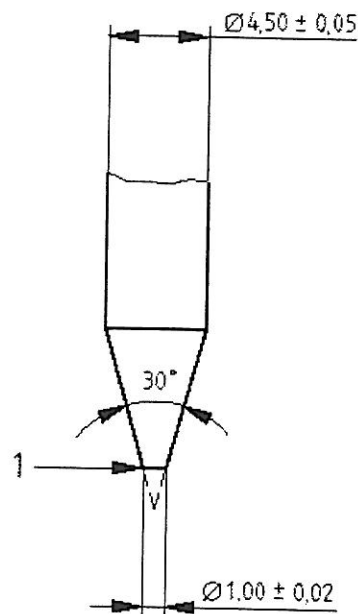
Even though the thorough work done in CEN standardisation working groups (CEN/TC 161/WG 1, 2 & 3) in renewal of the standards, there still exist discrepancies between real risks and current standards. In this paper some examples of these discrepancies are given. However, it is good to keep in mind that such discrepancies may occur with all kinds of PPE, not only in the case of safety footwear.

7.2. Examples of discrepancies

7.2.1. Penetration-resistant inserts

New materials are constantly being developed in order to be used in PPE. The use of these new materials can cause unforeseeable risks to the users of PPE if the test methods and specifications, defined in applicable European standards and used in type-examination process, are originally intended for other types of materials and are not directly suitable for these new materials. In our point of view at FIOH, this is the case e.g. with the non-metallic penetration-resistant inserts of safety footwear.

In the European standard EN ISO 20344:2004 it is stated that when testing the penetration resistance the nail shall be pressed against the sole unit at a constant speed of (10 ± 3) mm/min until the point has penetrated completely and measure the maximum force. The nail to be used in the test shall be of diameter $(4,50 \pm 0,05)$ mm with a truncated end (Figure 7.1.). According to EN ISO 20345:2004 the force required to penetrate the sole unit shall be not less than 1100 N.



1 Truncated end

Dimensions in mm

Figure 7.1. The standard test nail for penetration resistance test (EN ISO 20344:2004).

New types of composite material and textile inserts made up of several layers fulfil the penetration resistance requirement of 1100 N when measured with a truncated test nail according to the standard. However, perforation values are reduced to half of those obtained with the test nail defined in the standard when measured using nails commonly used e.g. in the construction industry (diameter of about 2,5 - 3 mm). These types of thinner nails represent risks of real life situation. Also, the perforation values are significantly reduced (Figure

7.2.) when the nail of same diameter than that defined in the standard, but with non-truncated end is used in testing.

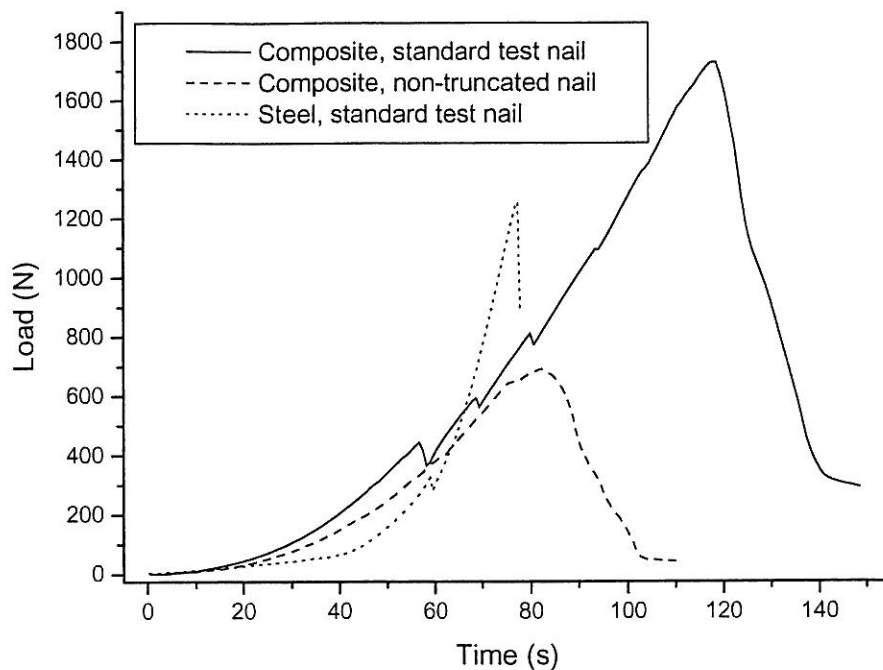


Figure 7.2. Perforation values with test nail and non-truncated nail for steel and composite material inserts.

7.2.2. Toecaps

New materials are nowadays also being used when manufacturing toecaps for safety footwear. Some non-metallic (composite material) toecaps have been found to fulfil the requirements stated in the standard for the clearance under the toecap at a compression load of required level. In the standardized compression test method, the platens between which the tested toecap is positioned shall remain parallel during the application of the load and the measurement of the force shall not be affected by eccentrically applied forces. When making an additional compression test for toecaps in order to simulate situation in which e.g. a forklift runs over foot, it has been found that unlike steel toecaps, non-metallic toecaps do not provide protection in this real risk.

7.2.3. Oil resistance of outsoles vs. slip resistance

Many accidents at work result from falling, mostly on the same level and mainly due to slipping. According to PPE Directive 89/686/EEC "the outsoles for footwear designed to prevent slipping must be so designed, manufactured or equipped with added elements as to ensure satisfactory adhesion by grip and friction having regard to the nature or state of the surface".

Oil resistance of outsoles is defined as an obligatory requirement for safety and protective footwear (EN ISO 20345:2004 – 20346:2004, EN ISO 17249:2004).

However, non-oil resistant outsole materials, such as thermoplastic or natural rubber, have been proved to be more slip resistant in winter conditions than oil resistant materials. Therefore, European standards with their obligatory requirement of oil resistant outsoles seem to restrict the use of more slip resistant outsole materials especially in icy conditions. Oil resistance of outsoles should thus be changed to be an additional requirement in order to allow slip resistant materials to be used as outsole materials when the slipping risk is higher than the risk caused by fuel oil, e.g. in the case of footwear with resistance to chain saw cutting which are mainly used outdoors.

7.3. Conclusions

As above-mentioned examples of safety footwear clearly show, a Notified Body may get a PPE to be type-examined which meets the requirements of EN standards but is not in conformity with the essential requirements of PPE Directive. These products may cause risk in real wear conditions when placed on the market. For the personnel of an inspection body it is a problem how to proceed in this kind of situation. Should one refuse to accept CE type approval and even demand the use of Safe Guard Close? Or should one wait for a recommendation of vertical / horizontal group or an amendment to a standard?