
**Personal protective equipment —
Footwear protecting against risks in
foundries and welding —**

**Part 1:
Requirements and test methods for
protection against risks in foundries**

*Équipement de protection individuelle — Chaussures de protection
contre les risques dans les fonderies et lors d'opérations de soudage —*

*Partie 1: Exigences et méthode d'essai pour la protection contre les
risques dans les fonderies*

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by the European Committee Standardization (CEN) Technical Committee CEN/TC 161, *Foot and leg protectors in equipment*, in collaboration with ISO Technical Committee TC 94 *Personal safety — Protective clothing and equipment*, Subcommittee SC 3, *Foot protection*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 20349-1 cancels and replaces ISO 20349:2010, which has been technically revised.

A list of all parts in the ISO 20349 series can be found on the ISO website.

Personal protective equipment — Footwear protecting against risks in foundries and welding —

Part 1:

Requirements and test methods for protection against risks in foundries

WARNING — This document calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

1 Scope

This document specifies requirements and test methods for footwear protecting users against risks, such as those encountered in foundries.

Footwear complying with this document also offers other protection as defined in ISO 20345.

NOTE Gaiters over boot and clothing intended to provide protection to the feet and legs against molten metal are addressed by ISO 11612.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17227:2002, *Leather — Physical and mechanical tests — Determination of dry heat resistance of leather*

ISO 20344:2011, *Personal protective equipment — Test methods for footwear*

ISO 20345:2011, *Personal protective equipment — Safety footwear*

EN 702:1995, *Protective clothing — Protection against heat and flame — Test method — Determination of the contact heat transmission through protective clothing or its materials*

EN 12477, *Protective gloves for welders*

EN 15090:2012, *Foot wear for firefighters*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20345 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Classification of footwear

Footwear shall be class I footwear manufactured from leather and other materials, excluding all-rubber or all-polymeric footwear

5 Sampling and conditioning

For test methods described in ISO 20344, the number of test pieces and conditioning applied shall be as described within the method.

For test methods defined within this document, the assessment and testing shall be carried out on the smallest, one of the middle and the largest size, covering the full range of manufacturing size. Unless otherwise stated, within the test method, the specimens shall be conditioned in accordance with the requirements given in ISO 20344.

If it is not possible to obtain a large enough test piece from the footwear, then a sample of the material from which the component has been manufactured may be used instead. This should be noted in the test report.

6 Requirements

Footwear protecting against risks as found in foundries shall conform to the requirements specified in [Table 1](#).

Table 1 — Performance requirements

Requirements		Standard clause		Footwear classification class I
		ISO 20345:2011	ISO 20349-1:2016	
Design	Height of upper		7.1	X
	Seat region	5.2.3		X
Whole footwear	Footwear Design Sole performance:	5.3.1	7.2	X
	Construction	5.3.1.1		X
	Upper/outsole bond strength	5.3.1.2		X
	Toe protection:	5.3.2		
	General	5.3.2.1		X
	Internal length	5.3.2.2		X
	Impact resistance	5.3.2.3		X
	Compression resistance	5.3.2.4		X
	Behaviour of toecaps	5.3.2.5		X
	Specific ergonomic features	5.3.4	7.8	X
	Footwear removal time			X
	Innocuousness		7.9	X
	Slip resistance ^	5.3.5		X
	Slip resistance on tile floor ceramic with SLS (S RA)	5.3.5.2		
	Slip resistance on steel floor with glycerol (SRB)	5.3.5.3		
	Slip resistance on ceramic tile floor with SLS and on steel floor with glycerol (SRC)	5.3.5.4		

Table 1 (continued)

Requirements		Standard clause		Footwear classification class I
		ISO 20345:2011	ISO 20349-1:2016	
Whole foot- wear	Perforation resistance (P)	6.2.1		*
	Antistatic footwear (A)	6.2.2.2		*
	Electrically insulating footwear (Symbol according to EN 50321)	6.2.2.3		*
	Cold insulation of sole complex (CI)	6.2.3.2		*
	Energy absorption of seat region (E)	6.2.4		*
	Water resistance (WR)	6.2.5		*
	Metatarsal protection (M)	6.2.6		*
	Ankle protection (AN)	6.2.7		*
	Cut resistance (CR)	6.2.8		*
	Resistance to effects of molten metal (Fe or Al)		7.3	X
	Resistance of upper to contact heat transmission		7.4	X
	Burning behaviour		7.5	X
	Heat insulation of sole complex		7.6	X
Upper (all parts)	Tear strength	5.4.3		X
	Tensile properties	5.4.4		X
	Water vapour permeability and coefficient	5.4.6		X
	pH value	5.4.7		X
	Chromium VI content	5.4.9		X
	Water penetration and water absorption (WRU)	6.3		*
	Surface shrinkage		7.7	X
Tongue	Tear strength	5.6.1		0
	pH Value	5.6.2		0
	Chromium VI content	5.6.3		0
Insole/ in- sock		Table 3		X
Vamp lining	Tear strength	5.5.1		X
	Abrasion resistance	5.5.2		X
	Water vapour permeability and coefficient	5.5.3		X
	pH value	5.5.4		X
	Chromium VI content	5.5.5		X
Quarter lin- ing	Tear strength	5.5.1		0
	Abrasion resistance	5.5.2		0
	Water vapour permeability and coefficient	5.5.3		0
	pH value	5.5.4		0
	Chromium VI content	5.5.5		0