INTERNATIONAL STANDARD

ISO 20349-2

First edition
2017-07

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

Part 2: Requirements and test methods for protection against risks in welding and allied processes

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

Partie 2: Exigences et méthodes d'essai pour la protection contre les risques lors d'opérations de soudage et techniques connexes

Reference number
ISO 20349-2:2017(E)

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

Contents

Page

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 20349-2 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 2:
Requirements and test methods for protection against risks in welding and allied processes

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 welding and allied process.

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

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

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

EN 348, *Protective clothing — Determination of behaviour of materials on impact of small splashes of molten metal*

EN 15090:2012, *Foot wear for firefighters*

EN 50321:1999, *Electrical insulating foot wear for working on low voltage installations*

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 Classifications of footwear

Footwear shall be class I or class II as defined in Table 1.

Table 1 — Classification of footwear

Classification	Description
Class I	Footwear made from leather and other materials, excluding all-rubber or all-polymeric footwear
Class II	All-rubber (i.e. entirely vulcanized) or all-polymeric (i.e. entirely moulded) 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 shall conform to the requirements specified in Table 2.

Table 2 — Performance requirements

Requirements		Standard clause		Footwear classification	
		ISO 20345:2011	ISO 20349-2:2016	Class I	Class II
Design	Height of upper		7.1	X	X
	Seat region	5.2.3		X	X
Whole footwear	Footwear Design Sole performance:	5.3.1	7.2	X	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	X
	Internal length	5.3.2.2		X	X
	Impact resistance	5.3.2.3		X	X
	Compression resistance	5.3.2.4		X	X
	Behaviour of toecaps	5.3.2.5		X	X
	Leakproofness	5.3.3			X
	Innocuousness		7.5		X

Table 2 *(continued)*

Whole footwear	Specific ergonomic features	5.3.4		X	X
	Slip resistance ^ Slip resistance on tile floor ceramic with SLS (SRA) Slip resistance on steel floor with glycerol (SRB) Slip resistance on ceramic tile floor with SLS and on steel floor with glycerol (SRC)	5.3.5 5.3.5.2 5.3.5.3 5.3.5.4		X	X
	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		*	*
	Molten metal splashes (WG)		7.3	X	X
	Heat insulation of sole complex (HI)	6.2.3.1		*	*
Upper (all parts)	Thickness	5.4.2			X
	Tear strength	5.4.3		X	
	Tensile properties	5.4.4		X	X
	Flexing resistance	5.4.5			X
	Water vapour permeability and coefficient	5.4.6		X	
	pH value	5.4.7		X	
	Hydrolysis	5.4.8			X
	Chromium VI content	5.4.9		X	
	Water penetration and water absorption (WRU)	6.3		*	
	Burning behaviour		7.4	X	X
Insole/ insock		Table 3		X	O
Vamp lining	Tear Strength	5.5.1		X	O
	Abrasion resistance	5.5.2		X	O
	Water vapour permeability and coefficient	5.5.3		X	O
	pH value	5.5.4		X	O
	Chromium VI content	5.5.5		X	O

Table 2 *(continued)*

Quarter lining	Tear strength	5.5.1		O	O
	Abrasion resistance	5.5.2		O	O
	Water vapour permeability and coefficient	5.5.3		O	O
	pH value	5.5.4		O	O
	Chromium VI content	5.5.5		O	O
Tongue	Tear strength	5.6.1		O	O
	pH Value	5.6.2		O	O
	Chromium VI content	5.6.3		O	O
Outsole	Outsole Design	5.8.1		X	X
	Tear strength	5.8.2		X	X
	Abrasion resistance	5.8.3		X	X
	Flexing resistance	5.8.4		X	X
	Hydrolysis	5.8.5		X	X
	Interlayer bond strength	5.8.6		O	O
	Resistance to hot contact (HRO)	6.4.1		X	X
	Resistance to fuel oil (FO)	6.4.2		*	*

The absence of X or O indicates that there is no requirement.

The applicability of a requirement to a particular classification is indicated in this table by the following.

X The requirement shall be met. In some cases, the requirement relates only to particular materials within the classification, e.g. pH value of leather components. This does not mean that other materials are precluded from use.

O If the component part exists, the requirement shall be met.

* If the property is claimed, the requirement given in the appropriate clause shall be met.

^ One of the three slip resistance requirements shall be chosen.

7 Specific requirements

7.1 Height of upper

When tested in accordance with ISO 20345:2011, 5.2.2, the height of upper shall be not less than Design B. If a flap is present, it shall have at least the height of the upper.

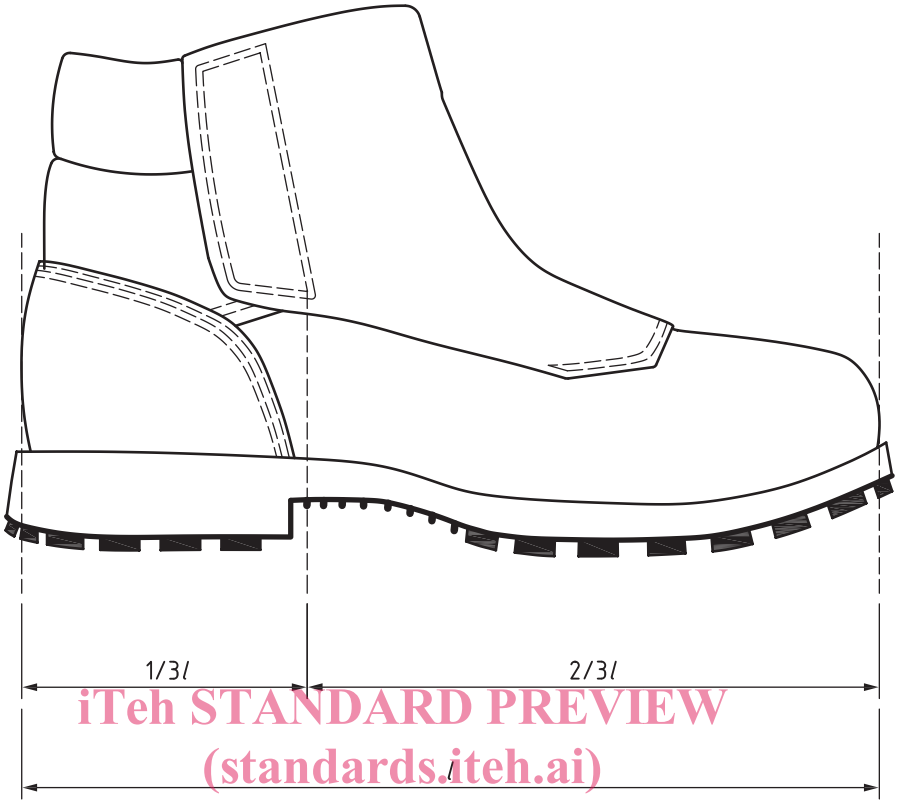
7.2 Upper design

7.2.1 There shall be no features on the outer surface of the footwear that could trap molten metal around the front 2/3 of the footwear. Straps and buckles to enable fastening that could present a trapping risk are permitted around the rear 1/3 of the footwear. Measurements are made on the upper from rear most point of the counter to the front of the toe (see Figure 1).

7.2.2 There shall be no upward-facing seams around the front 2/3 of the footwear. Upward-facing seams, for example, the counter seam are permitted around the rear 1/3 of the footwear. Measurements are made on the upper from rear most point of the counter to the front of the toe (see Figure 1)

7.2.3 The vamp shall comprise a single piece.

7.2.4 If there is a tongue, it should be fully covered by parts of the upper. If the material is exposed on any points, it shall be treated as an upper.



Key

l total length of footwear from toe to heel

Figure 1 — Footwear design

7.3 Small molten metal splash test

Testing shall be carried out in accordance with the procedure described in EN 348.

The whole upper assembly shall be tested, the number of droplets required to produce a temperature rise of 40 °C shall be at least 25. All material combinations shall be tested. One test piece shall be taken from each material combination from each of the smallest, middle and largest sizes of footwear.

7.4 Burning behaviour

Footwear shall comply with EN 15090:2012 6.3.3, excluding the outsole.

7.5 Innocuousness

Footwear protecting against risks as found in welding and allied processes shall not adversely affect the health or hygiene of the user. Footwear protecting against risks as found in welding and allied processes shall be mad of materials such as textiles, leather, rubbers, plastics that have been shown to be chemically suitable. The materials shall not, in the foreseeable conditions of normal use, release or degrade to release substances generally known to be toxic, carcinogenic, mutagenic, allergenic, toxic to reproduction or otherwise harmful. Information claiming that the product is innocuous shall be checked.

NOTE Information about critical substances in footwear and footwear components can be found in ISO/TR 16178.