

# *Geregistreeerde Belgische norm*

## **NBN EN ISO 20344**

1e uitg., september 2004

**Normklasse: S 05**

### **Persoonlijke beschermingsmiddelen - Beproevingmethoden voor schoeisel (ISO 20344:2004) (+AC:2005)**

Equipement de protection individuelle - Méthodes d'essais pour les chaussures (ISO 20344:2004) (+AC:2005)

Personal protective equipment - Test methods for footwear (ISO 20344:2004) (+AC:2005)

#### **Toelating tot publicatie: 30 september 2004**

Vervangt NBN EN 344 (1993, NBN EN 344/A1 (1997) en NBN EN 344-2 (1996).

Deze Europese norm EN ISO 20344: 2004 heeft de status van een Belgische norm.

Deze Europese norm bestaat in drie officiële versies (Duits, Engels, Frans).

Deze Europese norm is opgesteld in het kader van een Mandaat dat aan de CEN is gegeven door de Europese Commissie en de Europese Vrijhandelsassociatie; hij ondersteunt de fundamentele eisen van de EU-Richtlijn 89/686/EEG betreffende de onderlinge afstemming van de wetgevingen van de Lidstaten in verband met persoonlijke beschermingsmiddelen.

*norme belge  
enregistrée*

**NBN EN ISO 20344**

1e éd., septembre 2004

**Indice de classement: S 05**

---

**Equipement de protection individuelle - Méthodes d'essais pour les chaussures (ISO 20344:2004) (+AC:2005)**

Persoonlijke beschermingsmiddelen - Beproevingmethoden voor schoeisel (ISO 20344:2004) (+AC:2005)

Personal protective equipment - Test methods for footwear (ISO 20344:2004) (+AC:2005)

---

**Autorisation de publication: 30 septembre 2004**

Remplace NBN EN 344 (1993), NBN EN 344/A1 (1997) et NBN EN 344-2 (1996).

.

La présente norme européenne EN ISO 20344: 2004 a le statut d'une norme belge.

La présente norme européenne existe en trois versions officielles (allemand, anglais, français).

La présente norme européenne a été élaborée dans le cadre d'un Mandat donné au CEN par la Commission Européenne et l'Association Européenne de Libre Échange et vient à l'appui des exigences essentielles de la Directive UE 89/686/CEE concernant le rapprochement des législations des Etats membres relatives aux équipements de protection individuelle.



**Bureau de Normalisation - Avenue de la Brabançonne 29 - 1000 Bruxelles - Belgique**

Tél: +32 2 738 01 12 - Fax: +32 2 733 42 64 - E-mail: info@nbn.be - NBN Online: www.nbn.be

Banque 000-3255621-10 IBAN BE41 0003 2556 2110 BIC BPOT BEB1 TVA: BE 0880.857.592

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 20344**

August 2004

ICS 13.340.50

Supersedes EN 344:1992, EN 344-2:1996

English version

**Personal protective equipment - Test methods for footwear  
(ISO 20344:2004)**

Équipement de protection individuelle - Méthodes d'essai  
pour les chaussures (ISO 20344:2004)

Persönliche Schutzausrüstung - Prüfverfahren für Schuhe  
(ISO 20344:2004)

This European Standard was approved by CEN on 2 January 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

# Contents

page

Foreword.....	5
1. Scope .....	6
2. Normative references .....	6
3. Terms and definitions .....	7
4. Sampling and conditioning.....	7
5. Test methods for whole footwear .....	9
5.1 Specific ergonomic features.....	9
5.2 Determination of upper/outsole and sole interlayer bond strength .....	10
5.2.1 Principle.....	10
5.2.2 Apparatus .....	10
5.2.3 Preparation of test pieces.....	11
5.2.4 Measurement of bond strength .....	13
5.2.5 Calculation and expression of results.....	14
5.3 Determination of internal toecap length.....	15
5.3.1 Preparation of test piece.....	15
5.3.2 Determination of the test axis .....	15
5.3.3 Test procedure .....	15
5.4 Determination of impact resistance.....	16
5.4.1 Apparatus .....	16
5.4.2 Procedure .....	17
5.5 Determination of compression resistance.....	20
5.5.1 Apparatus .....	20
5.5.2 Procedure .....	20
5.5.3 Test procedure.....	21
5.6 Determination of corrosion resistance.....	21
5.6.1 Determination of corrosion resistance of metallic toecaps or penetration-resistant metallic inserts in classification II footwear.....	21
5.6.2 Determination of corrosion resistance of metallic toecaps in classification I footwear.....	22
5.6.3 Determination of the corrosion resistance of penetration-resistant metallic inserts in footwear other than all-rubber footwear.....	22
5.7 Determination of leakproofness.....	22
5.7.1 Apparatus .....	22
5.7.2 Preparation of test piece.....	22
5.7.3 Procedure .....	22
5.8 Determination of the dimensional conformity of inserts and the penetration resistance of the sole .....	22
5.8.1 Dimensional conformity of inserts.....	22
5.8.2 Determination of the penetration resistance of the sole .....	23
5.9 Determination of the flex resistance of penetration-resistant inserts .....	25
5.10 Determination of electrical resistance.....	25
5.10.1 Principle.....	25
5.10.2 Apparatus .....	25
5.10.3 Preparation for conditioning of test piece .....	25
5.10.4 Procedure .....	26
5.11 Determination of the electrical insulation .....	26
5.12 Determination of insulation against heat .....	26
5.12.1 Apparatus .....	26
5.12.2 Preparation of test piece.....	26
5.12.3 Test procedure.....	27
5.13 Determination of insulation against cold .....	27
5.13.1 Apparatus .....	27
5.13.2 Preparation of test piece.....	28
5.13.3 Test procedure.....	28

5.14 Determination of energy absorption of seat region .....	29
5.14.1 Apparatus .....	29
5.14.2 Procedure .....	30
5.15 Determination of resistance to water for whole footwear .....	31
5.15.1 Trough test .....	31
5.15.2 Machine method .....	32
5.15.2.1 Principle .....	32
5.15.2.2 Apparatus .....	32
5.16 Determination of impact resistance of metatarsal protective device .....	38
5.16.1 Apparatus .....	38
5.16.2 Preparation of test piece .....	41
5.16.3 Procedure .....	41
5.16.4 Test results .....	42
5.17 Determination of the shock absorption capacity of ankle protection materials incorporated into the upper .....	42
5.17.1 Principle .....	42
5.17.2 Apparatus .....	43
5.17.2.5 Templates .....	44
5.17.2.6 Sampling .....	44
5.17.3 Preparation of test pieces .....	45
5.17.4 Conditioning .....	45
5.17.5 Procedure .....	45
5.17.6 Test report .....	45
6. Test methods for upper, lining and tongue .....	46
6.1 Determination of thickness of upper .....	46
6.2 Measurement of the height of the upper .....	46
6.2.1 Preparation of test piece .....	46
6.2.2 Measurement .....	46
6.3 Determination of tear strength of upper, lining and/or tongue .....	46
6.4 Determination of the tensile properties of upper material .....	47
6.5 Determination of upper flexing resistance .....	47
6.6 Determination of water vapour permeability .....	47
6.6.1 Principle .....	47
6.6.2 Apparatus .....	47
6.6.3 Preparation of test piece .....	50
6.6.4 Test procedure .....	51
6.6.5 Calculation and expression of results .....	52
6.7 Determination of water vapour absorption .....	52
6.7.1 Principle .....	52
6.7.2 Apparatus .....	52
6.7.3 Preparation of test piece .....	53
6.7.4 Test procedure .....	53
6.7.5 Calculation and expression of results .....	54
6.8 Determination of water vapour coefficient .....	54
6.9 Determination of pH value .....	54
6.10 Determination of resistance to hydrolysis of upper .....	54
6.11 Determination of chromium VI content .....	54
6.11.1 Principle .....	54
6.11.2 Chemicals .....	55
6.11.3 Apparatus .....	55
6.11.4 Procedure .....	56
6.11.5 Determination of the recovery rate .....	57
6.11.6 Calculation and expression of results .....	58
6.11.7. Test report .....	59
6.12 Determination of abrasion resistance of lining and insock .....	59
6.12.1 Principle .....	59
6.12.2 Apparatus .....	59
6.12.3 Atmosphere for testing .....	60
6.12.4 Preparation of test pieces and materials .....	60
6.12.5 Procedure .....	60
6.12.6 Method of assessment .....	61

## EN ISO 20344:2004 (E)

6.13 Determination of water penetration and water absorption for upper.....	61
6.13.1 Principle.....	61
6.13.2 Apparatus .....	62
6.13.3 Preparation of test piece.....	62
6.13.4 Procedure .....	62
6.13.5 Calculation and expression of results.....	63
6.14 Determination of resistance of upper to cutting .....	63
6.14.1 Preparation of test piece.....	63
6.14.2 Procedure .....	63
7. Test methods for insole and insock .....	63
7.1 Determination of insole thickness .....	63
7.2 Determination of water absorption and desorption of insole and insock .....	63
7.2.1 Principle.....	63
7.2.2. Apparatus .....	64
7.2.3 Sampling and conditioning.....	65
7.2.4 Procedure .....	65
7.2.5 Expression of results .....	65
7.2.6 Test report .....	66
7.3 Determination of abrasion resistance of insole .....	66
7.3.1 Principle.....	66
7.3.2 Apparatus .....	66
7.3.3 Preparation of test piece.....	67
7.3.4 Preparation of abradant pads.....	67
7.3.5 Procedure .....	67
7.3.6 Method of assessment.....	67
8 Test methods for outsole.....	68
8.1 Determination of outsole thickness.....	68
8.1.1 Determination of conformity of the cleated area.....	68
8.1.2 Outsole thickness.....	68
8.2 Determination of tear strength of outsole.....	68
8.3 Determination of outsole abrasion resistance .....	69
8.4 Determination of flexing resistance of outsole .....	69
8.4.1 Rigidity test .....	69
8.4.2 Flexing test.....	71
8.5 Determination of resistance to hydrolysis of outsole.....	74
8.6 Determination of resistance to fuel oil .....	74
8.6.1 General method.....	74
8.6.2 Method for outsole materials which shrink or become hardened.....	74
8.7 Determination of resistance to hot contact .....	74
8.7.1 Apparatus .....	74
8.7.2 Preparation of test specimen .....	76
8.7.3 Procedure .....	77
8.7.4 Method of assessment.....	77
Annex ZA (Informative) Clauses of this European Standard addressing essential requirements or other provisions of EU directives .....	78
Annex ZB (normative) Corresponding International and European Standards for which equivalents are not given in the text .....	79

## Foreword

This document (EN ISO 20344:2004) has been prepared by CEN/TC 161, "Foot and leg protectors", the secretariat of which is held by BSI in collaboration with ISO/TC 94 "Personal safety - Protective clothing and equipment".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2005, and conflicting national standards shall be withdrawn at the latest by August 2005.

This document supersedes EN 344:1992 and EN 344-2: 1996.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom

## EN ISO 20344:2004 (E)

### 1. Scope

This Standard specifies methods for testing footwear designed as personal protective equipment.

### 2. Normative references

The following referenced documents are indispensable for the application 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.

EN 388:1994, Protective gloves against mechanical risks

EN 12568:1998, Foot and leg protectors — Requirements and test methods for toecaps and metal penetration resistant inserts

EN 50321:1999, Electrically insulating footwear for working on low voltage installations

EN ISO 868, Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)

EN ISO 3696, Water for analytical laboratory use – Specification and test methods (ISO 3696:1987)

EN ISO 3376:2002, Leather — Physical and mechanical tests - Determination of tensile strength and percentage extension (ISO 3376:2002)

EN ISO 3377-2, Leather - Physical and mechanical tests - Determination of tear load (ISO 3377-2: 2002)

EN ISO 4044, Leather — Preparation of chemical test samples (ISO 4044:1977)

EN ISO 4045, Leather — determination of pH (ISO 4045:1977)

EN ISO 4674-1:2003, Rubber- or plastics-coated fabrics - Determination of tear resistance - Part 1: Constant rate of tear methods (ISO 4674-1:2003)

EN ISO 17249:2004, Safety footwear with resistance to chain saw cutting (ISO 17249: 2004)

EN ISO 20345, Personal protective equipment - Safety footwear (ISO 20345:2004)

EN ISO 20346, Personal protective equipment - Protective footwear (ISO 20346:2004)

EN ISO 20347, Personal protective equipment - Occupational footwear (ISO 20347:2004)

ISO 34-1:1994, Rubber, vulcanised or thermoplastic — Determination of tear strength — Part 1 : Trouser, angle and crescent test pieces

ISO 1817:1999, Rubber, vulcanised — Determination of the effect of liquids

ISO 2023:1994, Rubber footwear - Lined industrial vulcanized rubber boots - Specification

ISO 3290, Rolling bearings — Balls — Dimensions and tolerances

ISO 4643:1992, Moulded plastic footwear — Lined or unlined poly(vinyl chloride) boots for general industrial use — Specification

ISO 4648:1991, Rubber, vulcanized or thermoplastic — Determination of dimensions of test pieces and products for test purposes

ISO 4649:2002, Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device

ISO 5423:1992, Moulded plastic footwear — Lined or unlined polyurethane boots for general industrial use — Specification