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Adhesives for leather and footwear materials — Sole-upper bonds — Minimum strength requirements

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee PRI/52, Adhesives.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Adhesives for leather and footwear materials - Sole-upper bonds - Minimum strength requirements

Colles pour cuir et matériaux de la chaussure - Collages tige-semelle - Exigences minimales en matière de résistance

Klebstoffe für Leder und Schuhwerkstoffe - Sohlen-Obermaterial-Klebungen - Mindestanforderungen

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Contents

Foreword

This document (EN 15307:2014) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by June 2015, and conflicting national standards shall be withdrawn at the latest by June 2015.

This document supersedes EN 15307:2007.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

With respect the previous version of EN 15307, the following main changes have been made:

1. In order to clarify, the test in 5.2.1 has been reworded as follows:

“The peel resistance after 4 d storage in the standard atmosphere 23/50 according to ISO 554 shall be for sole-upper bonds of:

Class A: at least 2,5 N/mm;

Class B: at least 3,0 N/mm, or at least 2,5 N/mm with material failure;

Class C: at least 4,0 N/m or at least 3,0 N/mm with material failure;

Class D: at least 5,0 N/mm or at least 3,5 N/mm with material failure.

Definition of “material failure” is included in EN ISO 10365.”

2. In order to clarify 5.2.3, the sentence “(separation distance of the bonding)” has been added before the comma.

3. In order to clarify, the test in 6.5 has been reworded as follows:

“Before starting peel tests specified in 6.1 store the test pieces in the standard atmosphere of 23/50 according to ISO 554 for 4 d in case of test described in (5.2.1), for 2 min in case of test described in (5.2.2) and before warming up to (50 ± 2) ºC for 6 d in case of test described in (5.2.3).”

4. In Annex A, the full name of the abbreviations NBR, SBR, SBSR and PVC have been added between parentheses in the test.

SAFETY STATEMENT — Persons using this document should be familiar with the normal laboratory practice, if applicable. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory conditions.

ENVIRONMENTAL STATEMENT — It is understood that some of the material permitted in this standard may have negative environmental impact. As technological advantages lead to acceptable alternatives for these materials, they will be eliminated from this standard to the extent possible.

At the end of the test, the user of the standard should take care to carry out an appropriate disposal of the wastes, according to local regulation.

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

1 Scope

This European Standard defines for four main types of footwear minimum strength requirements for their sole-upper bonds produced with solvent-based or dispersion adhesives under specified conditions.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 923:2005+A1:2008, *Adhesives - Terms and definitions*

EN 1392, *Adhesives for leather and footwear materials-Solvent-based and dispersion adhesives-Testing of bond strength under specified conditions*

EN 15062, *Adhesives for leather and footwear materials - Solvent-based and dispersion adhesives - Testing ageing of bonds under specified conditions*

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

EN ISO 10365, *Adhesives - Designation of main failure patterns (ISO 10365)*

EN ISO 19952:2005, *Footwear - Vocabulary (ISO 19952:2005)*

ISO 554, *Standard atmospheres for conditioning and/or testing - Specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 923:2005+A1:2008 and EN ISO 19952:2005 and the following apply.

3.1
leather
tanned animal skin, usually free of hair

3.2
footwear materials
natural and synthetic materials which are suitable for footwear manufacture or repair and have adequate wear properties as upper or sole materials

4 Principle

The surfaces of the leathers or the footwear materials used are treated by a method specific to the type of material. Then strips of specified length and width are cut from the treated materials.

The treated surfaces are bonded by an adhesive to test pieces of specified form.

The test pieces are stored under specified conditions and their bond strength is determined under specified conditions.

5 Minimum strength requirements

5.1 Classification

In accordance with practical experience gained the different types of footwear can be classified with regard to the mechanical stress on its sole-upper bonds in use as follows:

Class A: Low stress on sole-upper bonds in use (i.e. infants footwear, indoor footwear, fashion footwear)

Class B: Medium stress on sole-upper bonds in use (i.e. men town footwear, women town footwear, cold weather footwear and casual footwear)

Class C: High stress on sole-upper bonds in use (i.e. children footwear and general sports footwear)

Class D: Very high stress on sole-upper bonds in use (i.e. mountain footwear)

5.2 Specifications

5.2.1 Peel resistance after 4 d at (23 ± 2)°C

The peel resistance after 4 d storage in the standard atmosphere 23/50 according to ISO 554 shall be for sole-upper bonds of:

Class A: at least 2,5 N/mm

Class B: at least 3,0 N/mm or at least 2,5 N/mm with material failure;

Class C: at least 4,0 N/mm or at least 3,0 N/mm with material failure;

Class D: at least 5,0 N/mm or at least 3,5 N/mm with material failure.

Definition of “material failure” is included in EN ISO 10365.

5.2.2 Initial peel resistance at (23 ± 2) º C

Regardless of the materials used the initial peel resistance 2 min after assembling shall be at least 1,0 N/mm.

5.2.3 Creep resistance under constant load at (50 ± 2) ºC

Regardless of the materials used the creep resistance at a load of 1,5 kg at (50 ± 2) ºC for 10 min (separation distance of the bonding), shall be less than 10 mm.

5.2.4 Ageing test

Bonds aged and reconditioned according to EN 15062 shall retain at least 80 % of their initial strength determined in the control test.

In any case, the strength of the aged and reconditioned bonds shall fulfil the minimum requirements specified in 5.2.1, 5.2.2 and 5.2.3.

Occurrence of cohesive substrate failure (CSF) and the value at which it was stated shall be recorded in the test report.

6 Test methods

6.1 Types of tests

6.1.1 Peel tests at (23 ± 2) °C

According to EN 1392.

6.1.2 Peel test at (50 ± 2) °C for 10 min at a constant load of 1,5 kg ("creep test")

According to EN 1392.

6.1.3 Ageing test

According to EN 15062.

6.2 Material identification

The leather(s) or footwear material(s) used under test shall be completely identified by name, manufacturer, date of manufacture/supply, type of leather or footwear material, e.g. soling or upper material. Leathers shall be listed by colour, thickness and type of tannage (if known). Rubber and plastic materials shall be listed by colour, polymer base and Shore-hardness according to EN ISO 868. This identification of materials shall be included in the test report.

Some reference footwear test materials with strictly specified and controlled properties have been developed for research, development and quality certification purposes by European national footwear research institutes (Annex A). If such a reference test material is used, its designation, source and date of supply shall be recorded in the test report.

6.3 Adhesive identification

The adhesive applied for bonding shall be identified by name, manufacturer, date of manufacture/supply and/or lot number, main polymer, type (solvent-based or dispersion) and colour. For two-part adhesives the nature of the crosslinking agent and the mixing ratio of the components shall be identified. This adhesive identification shall be included in the test report.

Some reference footwear test adhesives with strictly specified and controlled properties have been developed for research, development and quality certification purposes by some European national footwear research institutes (Annex A). If such a reference test adhesive is used, its designation, source and date of supply shall be recorded in the test report.

6.4 Preparation of test pieces

According to EN 1392.

6.5 Storage of test pieces

Before starting peel tests specified in 6.1 store the test pieces in the standard atmosphere 23/50 according to ISO 554 for 4 d (in case of test described in 5.2.1), for 2 min (in case of test described in 5.2.2) and before warming up to (50 ± 2) ºC for 6 d (in case of test described in 5.2.3).

6.6 Procedures and evaluation

According to EN 1392.

7 Test report

The test report shall include:

a) reference to this European Standard;

b) identification of the type of footwear to be manufactured (e.g. women town footwear, men town footwear, school footwear or casual footwear);

c) complete identification of the leather or footwear material used according to 6.2;

d) complete identification of the adhesive used for the preparation of the test pieces according to 6.3;

e) preparation of the bonding surfaces of the leather or footwear material according to EN 1392;

f) complete identification of the bonding procedure according to EN 1392 (adhesive applicator, number of adhesive coats applied, length of intermediate drying periods, contact or heat activated bonding, activation temperature of the adhesive coats etc.);

g) description of the conditions of storage of the test pieces;

h) test results, individual and mean values according to EN 1392 and mode of failure according to EN ISO 10365;

i) factors which may have affected the results;

j) date of test.

Annex A
(informative)

Reference test adhesives and reference test materials

In the footwear industry a large number of different solvent or dispersion adhesives are applied for sole-upper bonding offering a broad range of technical effects. The most important and most often adhesives used are based on polyurethane and polychloroprene.

For research, development and quality certification purposes some simply formulated 1- and 2-part test adhesives have been developed which can be considered as typical adhesives of these types (information from national footwear institutes), e.g.:

— Reference Test adhesive CR 1: One part polychloroprene solvent adhesive.

— Reference Test adhesive CR 2: Two part polychloroprene/polyisocyanate solvent adhesive.

— Reference Test adhesive PU 1: One part polyurethane solvent adhesive.

— Reference Test adhesive PU 2: Two part polyurethane/polyisocyanate solvent adhesive.

— Reference Test adhesive PUD 1: One part polyurethane dispersion adhesive.

— Reference Test adhesive PUD 2: Two part polyurethane/polyisocyanate dispersion adhesive.

In the footwear manufacture also a great number of different sole and upper materials are used. From the most important and most often applied material types some materials have been also selected as test material (information: national footwear institutes), e.g.:

— Reference Test material leather 1: Upper leather, chrome tanned split.

— Reference Test material leather 2: Sole leather, butt, vegetable tanned.

— Reference Test material SBR (Styrene Butadiene Rubber): SBR rubber, nominal Shore A hardness 70 according to EN ISO 868.

— Reference Test material NBR (Nitrile Butadiene Rubber): Nitrile rubber, Shore A hardness 80 nominal according to EN ISO 868.

— Reference Test material SBSR (Styrene Butadiene Styrene Rubber): Thermoplastic rubber, nominal Shore A hardness 60 according to EN ISO 868.

— Reference Test material PVC (poly vinyl chloride): Plasticized PVC, nominal Shore A hardness 70 according to EN ISO 868.

NOTE The properties of these reference footwear test materials (e.g. tannage, Shore hardness) serve only to distinguish the different materials, if necessary.

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