TECHNICAL REPORT

ISO/TR 20880

First edition
2007-02-15

Footwear — Performance requirements for components for footwear — Outsoles

Chaussures — Exigences de performance pour les composants des chaussures — Semelles d'usure

Reference number
ISO/TR 20880:2007(E)

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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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.

ISO/TR 20880 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 309, *Footwear*, in collaboration with Technical Committee ISO/TC 216, *Footwear*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Footwear — Performance requirements for components for footwear — Outsoles

1 Scope

This Technical Report establishes the performance requirements for outsoles components for footwear (not for the finished footwear), irrespective of the material, in order to assess the suitability for the end use. It also establishes the test methods to be used to evaluate the compliance with the requirements.

This Technical Report applies to outsoles for all kind of footwear as defined in Clause 3.

This Technical Report is intended to be used as a reference between the footwear manufacturer and the supplier. It is not intended for third party certification of finished shoes destined for the consumer.

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.

ISO 31-0, *Quantities and units — Part 0: General principles*

EN ISO 5404, *Leather — Physical and mechanical tests — Determination of the water resistance of heavy leathers*

EN ISO 17707, *Footwear — Test methods for outsoles — Flex resistance*

ISO 17709, *Footwear — Sampling location, preparation and duration of conditioning of samples and test pieces*

EN ISO 19952, *Footwear — Vocabulary*

ISO 20865, *Footwear — Test methods for outsoles — Compression energy*

ISO 20869, *Footwear — Test methods for outsoles, insoles, lining and insocks — Water soluble content*

ISO 20871, *Footwear — Test methods for outsoles — Abrasion resistance*

ISO 20872, *Footwear — Test methods for outsoles — Tear strength*

ISO 20873, *Footwear — Test methods for outsoles — Dimensional stability*

ISO 20874, *Footwear — Test methods for outsoles — Needle tear strength*

ISO 20875, *Footwear — Test methods for outsoles — Determination of split tear strength and delamination resistance*

EN 1391, *Adhesives for leather and footwear materials — A method for evaluating the bondability of materials — Minimum requirements and material classification*

EN 1392, *Adhesives for leather and footwear materials — Solvent-based and dispersion adhesives — Test methods for measuring the bond strength under specified conditions*

EN 13287, *Personal protective equipment — Footwear — Test method for slip resistance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 19952 apply.

4 Requirements

4.1 General

This Technical Report establishes two different types of performance requirement.

The essential requirements shall all be taken into account. The additional ones can be additionally agreed by the component supplier and the footwear manufacturer as indicated in the subclauses 4.2 to 4.10.

The results of each single analytical determination, as well as the average values, shall be rounded off in accordance with ISO 31-0.

When taken from finished footwear, the sample shall be prepared in accordance with ISO 17709.

4.2 Performance requirements for outsoles components for general purpose sports footwear

4.2.1 Essential requirements

These essential requirements shall be fulfilled in all cases. See Table 1.

Table 1 — Test method and properties for general sports footwear — Essential requirements

Test method	Property	Requirement
EN ISO 17707	Flex resistance	cut growth $\leqslant$ 4,0 mm, and no spontaneous crack
ISO 20871	Abrasion resistance	0,9 g/cm^3 $\leqslant d \leqslant$ 200 mm^3 0,9 g/cm^3 $> d \leqslant$ 150 mg
ISO 20875	Delamination resistance or split tear [a]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 1,7 N/mm
EN 13287	Slip resistance [b]	$\geqslant$ 0,30 (flat slip) $\geqslant$ 0,28 (heel slip) In both cases must be tested using ceramic tiles (floor) and water and detergent (lubricant)

[a] This requirement is considered essential only in multilayer outsoles.

[b] This test method is only applicable for finished footwear.

4.2.2 Additional requirements

These additional requirements should be agreed by both component supplier and footwear manufacturer. See Table 2.

Table 2 — Test method and properties for general sports footwear — Additional requirements

Subclause	Test method	Property	Requirement
4.2.2.1	ISO 20873	Dimensional stability	$\leqslant$ 2,5 %
4.2.2.2	ISO 20865	Compression energy	$\geqslant$ 15 J
4.2.2.3	EN 1392	Bondability [a, b, c]	0,9 g/cm^3 $\leqslant d \geqslant$ 4,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 3,0 N/mm
4.2.2.4	ISO 20869	Water soluble substances content	water soluble matter $\leqslant$ 18 % sulfated ashed water soluble $\leqslant$ 3 % (applicable only for leather)
4.2.2.5	ISO 20872	Tear strength	0,9 g/cm^3 $\leqslant d \geqslant$ 8,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 6,0 N/mm
4.2.2.6	EN/ISO 5404	Water resistance	a) Water resistant Penetration time $\geqslant$ 30 min and after 30 min water absorption $\leqslant$ 25 % b) Highly water resistant Penetration time $\geqslant$ 60 min and after 60 min water absorption $\leqslant$ 15 % (only applicable for leather and porous materials)
4.2.2.7	ISO 20874	Needle tear strength [d]	$\geqslant$ 40 N/mm

a A value below the established will be considered as negative independent of the type of failure.

b Reference adhesives and reference material shall comply with EN 1391.

c The dimensions and number of test pieces for this test method shall be those included in ISO 17709.

d This requirement is applicable only for sewn footwear.

4.3 Performance requirements for outsoles components for school footwear

4.3.1 Essential requirements

These essential requirements shall be fulfilled in all cases. See Table 3.

Table 3 — Test method and properties for school footwear — Essential requirements

Test method	Property	Requirement
EN ISO 17707	Flex resistance	cut growth $\leqslant$ 4,0 mm, and no spontaneous crack
ISO 20871	Abrasion resistance	0,9 g/cm^3 $\leqslant d \leqslant$ 200 mm^3 0,9 g/cm^3 $> d \leqslant$ 150 mg
ISO 20875	Delamination resistance or split tear [a]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 1,7 N/mm
EN 13287	Slip resistance [b]	$\geqslant$ 0,30 (flat slip) $\geqslant$ 0,28 (heel slip) In both cases must be tested using ceramic tiles (floor) and water and detergent (lubricant)

[a] This requirement is considered essential only in multilayer outsoles.

[b] This test method is only applicable for finished footwear.

4.3.2 Additional requirements

These additional requirements should be agreed by both component supplier and footwear manufacturer. See Table 4.

Table 4 — Test method and properties for school footwear — Additional requirements

Subclause	Test method	Property	Requirement
4.3.2.1	ISO 20873	Dimensional stability	$\leqslant$ 2,5 %
4.3.2.2	ISO 20865	Compression energy	$\geqslant$ 15 J
4.3.2.3	EN 1392	Bondability [a, b, c]	0,9 g/cm^3 $\leqslant d \geqslant$ 4,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 3,0 N/mm
4.3.2.4	ISO 20869	Water soluble substances content	water soluble matter $\leqslant$ 18 % sulfated ashed water soluble $\leqslant$ 3 % (applicable only for leather)
4.3.2.5	ISO 20872	Tear strength	0,9 g/cm^3 $\leqslant d \geqslant$ 8,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 6,0 N/mm
4.3.2.6	EN ISO 5404	Water resistance	a) Water resistant Penetration time $\geqslant$ 60 min and after 60 min water absorption $\leqslant$ 15 % b) Highly water resistant Penetration time $\geqslant$ 30 min and after 30 min water absorption $\leqslant$ 25 % (applicable only for leather and porous materials)
4.3.2.7	ISO 20874	Needle tear strength [d]	$\geqslant$ 35 N/mm

a A value below the established will be considered as negative independent of the type of failure.

b Reference adhesives and reference material shall comply with EN 1391.

c The dimensions and number of test pieces for this test method shall be those included in ISO 17709.

d This requirement is applicable only for sewn footwear.

4.4 Performance requirements for outsoles components for casual footwear

4.4.1 Essential requirements

These essential requirements shall be fulfilled in all cases. See Table 5.

Table 5 — Test method and properties for casual footwear — Essential requirements

Test method	Property	Requirement
EN ISO 17707	Flex resistance	cut growth $\leqslant$ 5,0 mm, and no spontaneous crack
ISO 20871	Abrasion resistance	0,9 g/cm^3 $\leqslant d \leqslant$ 250 mm^3 0,9 g/cm^3 $> d \leqslant$ 170 mg
ISO 20875	Delamination resistance or split tear [a]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 1,7 N/mm
EN 13287	Slip resistance [b]	$\geqslant$ 0,30 (flat slip) $\geqslant$ 0,28 (heel slip) In both cases must be tested using ceramic tiles (floor) and water and detergent (lubricant)

[a] This requirement is considered essential only in multilayer soles.

[b] This test method is only applicable for finished footwear.

4.4.2 Additional requirements

These additional requirements should be agreed by both component supplier and footwear manufacturer. See Table 6.

Table 6 — Test method and properties for casual footwear — Additional requirements

Subclause	Test method	Property	Requirement
4.4.2.1	ISO 20873	Dimensional stability	$\leqslant$ 2,5 %
4.4.2.2	ISO 20865	Compression energy	$\geqslant$ 15 J
4.4.2.3	EN 1392	Bondability [a, b, c]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,5 N/mm 0,9 g/cm^3 $> d \geqslant$ 3,0 N/mm
4.4.2.4	ISO 20869	Water soluble substances content	water soluble matter $\leqslant$ 18 % sulphated ashed water soluble $\leqslant$ 3 % (applicable only for leather)
4.4.2.5	ISO 20872	Tear strength	0,9 g/cm^3 $\leqslant d \geqslant$ 8,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 6,0 N/mm
4.4.2.6	EN ISO 5404	Water resistance	a) Water resistant Penetration time $\geqslant$ 30 min and after 30 min water absorption $\leqslant$ 25 % b) Highly water resistant Penetration time $\geqslant$ 60 min and after 60 min water absorption $\leqslant$ 15 % (only applicable for leather and porous materials)
4.4.2.7	ISO 20874	Needle tear strength [d]	$\geqslant$ 35 N/mm

[a] A value below the established will be considered as negative independent of the type of failure.

[b] Reference adhesives and reference material shall comply with EN 1391.

[c] The dimensions and number of test pieces for this test method shall be those included in ISO 17709.

[d] This requirement is applicable only for sewn footwear.

4.5 Performance requirements for outsoles components for men's town footwear

4.5.1 Essential requirements

These essential requirements shall be fulfilled in all cases. See Table 7.

Table 7 — Test method and properties for men's town footwear — Essential requirements

Test method	Property	Requirement
EN ISO 17707	Flex resistance	cut growth $\leqslant$ 6,0 mm, and no spontaneous crack
ISO 20871	Abrasion resistance	0,9 g/cm^3 $\leqslant d \leqslant$ 350 mm^3 0,9 g/cm^3 $> d \leqslant$ 200 mg
ISO 20875	Delamination resistance or split tear [a]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 1,7 N/mm
EN 13287	Slip resistance [b]	$\geqslant$ 0,30 (flat slip) $\geqslant$ 0,28 (heel slip) In both cases must be tested using ceramic tiles (floor) and water and detergent (lubricant)

a This requirement is considered essential only in multilayer outsoles.

b This test method is only applicable for finished footwear.

4.5.2 Additional requirements

These additional requirements should be agreed by both component supplier and footwear manufacturer. See Table 8.

Table 8 — Test method and properties for men's town footwear — Additional requirements

Subclause	Test method	Property	Requirement
4.5.2.1	ISO 20873	Dimensional stability	$\leqslant$ 2,5 %
4.5.2.2	ISO 20865	Compression energy	$\geqslant$ 15 J
4.5.2.3	EN 1392	Bondability [a, b, c]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,5 N/mm 0,9 g/cm^3 $> d \geqslant$ 3,0 N/mm
4.5.2.4	ISO 20869	WAter soluble substances content	water soluble matter $\leqslant$ 18 % sulphated ashed water soluble $\leqslant$ 3 % (applicable only for leather)
4.5.2.5	ISO 20872	Tear strength	0,9 g/cm^3 $\leqslant d \geqslant$ 7,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 4,0 N/mm
4.5.2.6	EN ISO 5404	Water resistance	a) Water resistant Penetration time $\geqslant$ 30 min and after 30 min water absorption $\leqslant$ 25 % b) Highly water resistant Penetration time $\geqslant$ 60 min and after 60 min water absorption $\leqslant$ 15 % (only applicable for leather and porous materials)
4.5.2.7	ISO 20874	Needle tear strength [d]	$\geqslant$ 30 N/mm

[a] A value below the established will be considered as negative independent of the type of failure.

[b] Reference adhesives and reference material shall comply with EN 1391.

[c] The dimensions and number of test pieces for this test method shall be those included in ISO 17709.

[d] This requirement is applicable only for sewn footwear.

4.6 Performance requirements for outsoles components for cold weather footwear

4.6.1 Essential requirements

These essential requirements shall be fulfilled in all cases. See Table 9.

Table 9 — Test method and properties for cold weather footwear — Essential requirements

Test method	Property	Requirement
EN ISO 17707	Flex resistance	cut growth $\leqslant$ 6,0 mm and no spontaneous crack, at −10 °C
ISO 20871	Abrasion resistance	0,9 g/cm^3 $\leqslant d \leqslant$ 200 mm^3 0,9 g/cm^3 $> d \leqslant$ 150 mg
ISO 20875	Delamination resistance or split tear [a]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 1,7 N/mm
EN 13287	Slip resistance [b]	$\geqslant$ 0,30 (flat slip) $\geqslant$ 0,28 (heel slip) In both cases must be tested using ceramic tiles (floor) and water and detergent (lubricant)

[a] This requirement is considered essential only in multilayer outsoles.

[b] This test method is only applicable for finished footwear.

4.6.2 Additional requirements

These additional requirements should be agreed by both component supplier and footwear manufacturer. See Table 10.

Table 10 — Test method and properties for cold weather footwear — Additional requirements

Subclause	Test method	Property	Requirement
4.6.2.1	ISO 20873	Dimensional stability	$\leqslant$ 2,5 %
4.6.2.2	ISO 20865	Compression energy	$\geqslant$ 15 J
4.6.2.3	EN 1392	Bondability [a, b, c]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,5 N/mm 0,9 g/cm^3 $> d \geqslant$ 3,0 N/mm
4.6.2.4	ISO 20869	Water soluble substances content	water soluble matter $\leqslant$ 18 % sulfated ashed water soluble $\leqslant$ 3 % (applicable only for leather)
4.6.2.5	ISO 20872	Tear strength	0,9 g/cm^3 $\leqslant d \geqslant$ 8,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 6,0 N/mm
4.6.2.6	EN ISO 5404	Water resistance	Penetration time $\geqslant$ 60 min and after 60 min water absorption $\leqslant$ 15 % (only applicable for leather and porous materials)
4.6.2.7	ISO 20874	Needle tear strength [d]	$\geqslant$ 35 N/mm

[a] A value below the established will be considered as negative independent of the type of failure.

[b] Reference adhesives and reference material shall comply with EN 1391.

[c] The dimensions and number of test pieces for this test method shall be those included in ISO 17709.

[d] This requirement is applicable only for sewn footwear.

4.7 Performance requirements for outsoles components for women's town footwear

4.7.1 Essential requirements

These essential requirements shall be fulfilled in all cases. See Table 11.

Table 11 — Test method and properties for women's town footwear — Essential requirements

Test method	Property	Requirement
EN ISO 17707	Flex resistance	cut growth $\leqslant$ 8,0 mm, and no spontaneous crack
ISO 20871	Abrasion resistance	0,9 g/cm^3 $\leqslant d \leqslant$ 400 mm^3 0,9 g/cm^3 $> d \leqslant$ 250 mg
ISO 20875	Delamination resistance or split tear [a]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 1,7 N/mm
EN 13287	Slip resistance [b]	$\geqslant$ 0,30 (flat slip) $\geqslant$ 0,28 (heel slip) In both cases must be tested using ceramic tiles (floor) and water and detergent (lubricant)

[a] This requirement is considered essential only in multilayer outsoles.

[b] This test method is only applicable for finished footwear.

4.7.2 Additional requirements

These additional requirements should be agreed by both component supplier and footwear manufacturer. See Table 12.

Table 12 — Test method and properties for women's town footwear — Additional requirements

Subclause	Test method	Property	Requirement
4.7.2.1	ISO 20873	Dimensional stability	$\leqslant$ 2,5 %
4.7.2.2	ISO 20865	Compression energy	$\geqslant$ 10 J
4.7.2.3	EN 1392	Bondability [a, b, c]	$\geqslant$ 3,0 N/mm
4.7.2.4	ISO 20869	Water soluble substances content	water soluble matter $\leqslant$ 18 % sulphated ashed water soluble $\leqslant$ 3 % (applicable only for leather)
4.7.2.5	ISO 20872	Tear strength	0,9 g/cm^3 $\leqslant d \geqslant$ 7,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 4,0 N/mm
4.7.2.6	EN ISO 5404	Water resistance	a) Water resistant Penetration time $\geqslant$ 30 min and after 30 min water absorption $\leqslant$ 25 % b) Highly water resistant Penetration time $\geqslant$ 60 min and after 60 min water absorption $\leqslant$ 15 % (only applicable for leather and porous materials)
4.7.2.7	ISO 20874	Needle tear strength [d]	$\geqslant$ 30 N/mm

[a] A value below the established will be considered as negative independent of the type of failure.

[b] Reference adhesives and reference material shall comply with EN 1391.

[c] The dimensions and number of test pieces for this test method shall be those included in ISO 17709.

[d] This requirement is applicable only for sewn footwear.

4.8 Performance requirements for outsoles components for fashion footwear

4.8.1 Essential requirements

These essential requirements shall be fulfilled in all cases. See Table 13.

Table 13 — Test method and properties for fashion footwear — Essential requirements

Test method	Property	Requirement
EN ISO 17707	Flex resistance	cut growth $\leqslant$ 12 mm, and no spontaneous crack
ISO 20871	Abrasion resistance	0,9 g/cm^3 $\leqslant d \leqslant$ 450 mm^3 0,9 g/cm^3 $> d \leqslant$ 300 mg
EN 13287	Slip resistance [a]	$\geqslant$ 0,30 (flat slip) $\geqslant$ 0,28 (heel slip) In both cases must be tested using ceramic tiles (floor) and water and detergent (lubricant)

[a] This test method is only applicable for finished footwear.

4.8.2 Additional requirements

These additional requirements should be agreed by both component supplier and footwear manufacturer. See Table 14.

Table 14 — Test method and properties for fashion footwear — Additional requirements

Subclause	Test method	Property	Requirement
4.8.2.1	ISO 20875	Delamination resistance or split tear [a]	0,9 g/cm^3 $\leqslant d \geqslant$ 3,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 1,7 N/mm
4.8.2.2	ISO 20873	Dimensional stability	$\leqslant$ 2,5 %
4.8.2.3	ISO 20865	Compression energy	$\geqslant$ 10 J
4.8.2.4	EN 1392	Bondability [b, c, d]	$\geqslant$ 2,5 N/mm
4.8.2.5	ISO 20869	Water soluble substances content	water soluble matter $\leqslant$ 18 % sulphated ashed water soluble $\leqslant$ 3 % (applicable only for leather)
4.8.2.6	ISO 20872	Tear strength	0,9 g/cm^3 $\leqslant d \geqslant$ 5,0 N/mm 0,9 g/cm^3 $> d \geqslant$ 4,0 N/mm
4.8.2.7	EN ISO 5404	Water resistance	penetration time $\geqslant$ 30 min and after 30 min water absorption $\leqslant$ 25 % (applicable only for leather and porous materials)
4.8.2.8	ISO 20874	Needle tear strength [e]	$\geqslant$ 20 N/mm

[a] This requirement is considered essential only in multilayer outsoles.

[b] A value below the established will be considered as negative independent of the type of failure.

[c] Reference adhesives and reference material shall comply with EN 1391.

[d] The dimensions and number of test pieces for this test method shall be those included in ISO 17709.

[e] This requirement is applicable only for sewn footwear.