
**Footwear — Test methods for
accessories: Metallic accessories —
Corrosion resistance**

*Chaussures — Méthodes d'essai pour accessoires: accessoires
métalliques — Résistance à la corrosion*

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Foreword

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ISO 22775 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 216, *Footwear*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read “...this European Standard...” to mean “...this International Standard...”.

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Foreword

This document (EN ISO 22775:2004) has been prepared by Technical Committee CEN/TC 309 "Footwear", the secretariat of which is held by AENOR, in collaboration with Technical Committee ISO/TC 216 "Footwear".

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of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

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.

1 Scope

This document specifies two methods for determining the propensity of a metal surface to either change visually due to contamination by atmospheric pollution (Method 1: sulphide tarnishing), or to corrode due to the action of salt water (Method 2: salt water corrosion).

2 Terms and definitions

For the purposes of this document, the following term and definition applies.

corrosion resistance

propensity of a metal surface either not to change visually due to chemical attack by atmospheric pollution, or not to be altered due to the action of salt water

3 Principle

3.1 Method 1

A test specimen is stored in a moist atmosphere containing a low concentration of hydrogen sulphide gas for 1 h. The specimen is then assessed subjectively for signs of discoloration.

3.2 Method 2

Cotton lawn, saturated with sodium chloride solution, is wrapped around a test specimen. This assembly is then stored in a sealed bag for 24 h at room temperature. The test specimen is then subjectively assessed for signs of corrosion and the lawn assessed for staining.

4 Apparatus, materials and reagents

4.1 Method 1

4.1.1 Kipps generator or other hydrogen sulphide source.

WARNING — This equipment should be used only by qualified personnel owing to the extremely toxicity of hydrogen sulphide.

4.1.2 Fume cupboard

4.1.3 Glass vessel which can be sealed and is of sufficient dimensions to contain the test specimen.

4.1.4 Glass tube with volume approximately equal to one thousandth of the volume of the glass vessel (4.1.3).

4.1.5 Means of suspending the test specimen in the glass vessel (4.1.3) so that the gas can circulate freely around it.

NOTE Sewing thread is suitable for small test specimens; larger specimens may require plastic supports underneath.

4.2 Method 2

4.2.1 Sealable polyethylene (PE) bags of sufficient dimensions to contain the cotton lawn (4.2.2) and test specimen.

4.2.2 Desized and bleached cotton lawn without finish, with an area approximately five times that of the surface area of the test specimen.

NOTE Cotton lawn is a fine plain-woven fabric, made in various fine sheer qualities.

4.2.3 Sodium chloride solution of density 30 g/dm³, sufficient quantity to fully saturate the cotton lawn (4.2.2).

5 Test specimens

5.1 Methods 1 and 2 each require two test specimens, one to be exposed to the reagents and one to be used as a reference for visually comparing any damage or discolouration of the exposed specimen. If both methods are to be carried out, then the same reference specimen can be used in both cases.

If only one test component is available for each test then cut the specimen into two pieces (see NOTE). The piece containing the portion considered to be least resistant to corrosion or tarnishing should be exposed to the reagents. If cutting is impracticable record details of flaws, marks and general appearance of the test specimen prior to exposure.

NOTE It is permissible to conduct this test on a part of a component provided that the part tested contains the portion of the complete component that is considered to be least resistant to corrosion or tarnishing. This may be necessary for a number of reasons such as:

- Method 1: the complete component is too large to fit into the vessel (4.1.3);
- Method 2: the complete component is too large to fit into the bag (4.2.1).

5.2 Cut a piece of suitable dimensions from the test specimen. This piece should contain the portion considered to be least resistant to either corrosion or tarnishing.

5.3 Seal any cut edges on the portion of the component to be exposed to the reagents with epoxy resin and allow the resin to harden for at least 24 h before proceeding with the test.

6 Conditioning

The test specimens do not need to be conditioned before testing, nor does the test need to be carried out in a standard atmosphere.

7 Procedure

7.1 Method 1

7.1.1 Fill the glass tube (4.1.4) with water and pour this into the bottom of the vessel (4.1.3).

7.1.2 Seal the vessel and leave it for a minimum of 1 h to enable the humidity inside the vessel to increase and stabilise.

7.1.3 Open the vessel and put one of the test specimens inside, using the sewing thread or plastic supports (4.1.5) to suspend or support the specimen so that it is not in contact with the base of the vessel or the water.

7.1.4 Dry the glass tube fill it with hydrogen sulphide gas (4.1.1) and seal it.

WARNING — Hydrogen sulphide gas is very toxic and has an unpleasant smell. Extreme care should be taken not to inhale any of the gas and this test must be conducted in a fume cupboard.

7.1.5 Simultaneously remove the seal from the filled glass tube and place the tube in the vessel. Immediately reseal the vessel.

7.1.6 After 60 min $\pm$ 5 min remove the test specimen from the vessel.

7.1.7 Place the two test specimens, one which has been exposed to hydrogen sulphide gas and one which has not, alongside each other in bright indirect lighting conditions.

7.1.8 Visually compare the two test specimens from a range of viewing angles and grade the difference according to the scale specified in 8.1.

NOTE 1 The difference between a treated and an untreated test specimen is visually assessed.

NOTE 2 Assessment of the relevance of any damage or discolouration to the test specimen in this test is a very subjective process. It is therefore important to know as much as possible about the proposed application of the material and to include a full description of damage incurred by the test specimen in the final report. It is highly recommended that the assessment be carried out by several persons, ideally at least three persons.

NOTE 3 Nickel plated articles may perform relatively poorly in this test. Severe discolouration should be ignored provided that it is uniform.

7.2 Method 2

7.2.1 Saturate the cotton lawn (4.2.2) with the sodium chloride solution (4.2.3) at room temperature.

7.2.2 Loosely wrap one of the test specimens in the wet cotton lawn ensuring that the contact area between the lawn and specimen is maximised.

7.2.3 Place the test specimen and cotton lawn assembly into the bag (4.2.1). Seal the bag without expelling the air from inside so that it is partially inflated.

7.2.4 Store the bag and assembly for 24 h $\pm$ 1 h at room temperature. Then remove the assembly from the bag and take the test specimen out of the cotton lawn.

7.2.5 Fully rinse the test specimen and the cotton lawn in running tap water and allow them both to dry.

7.2.6 Place the cotton lawn and the two test specimens, one which has been exposed to salt water and one which has not, alongside each other in bright indirect lighting conditions.

7.2.7 Visually compare (see NOTE in 7.1.8) the two test specimens from a range of viewing angles and grade the difference according to the scale specified in 8.2. Record also any staining of the cotton lawn. It is highly recommended that the assessment be carried out by several persons, ideally at least three persons.

8 Calculation and expression of results

8.1 Method 1

The following scale shall be used to grade the difference between the test specimen exposed to hydrogen sulphide gas and the non exposed one:

5 – No change

4 – Slight uniform change

3 – Slight patchy change

2 – Marked change