



SLOVENSKI STANDARD
SIST EN 2591-306:2001
01-januar-2001

Aerospace series - Elements of electrical and optical connection - Test methods - Part 306: Mould growth

Aerospace series - Elements of electrical and optical connection - Test methods - Part 306: Mould growth

Luft- und Raumfahrt - Elektrische und optische Verbindungselemente - Prüfverfahren - Teil 306: Schimmelwachstum

Série aérospatiale - Organes de connexion électrique et optique - Méthodes d'essais - Partie 306: Moisissures

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Ta slovenski standard je istoveten z: EN 2591-306:1998

ICS:

49.060 Štejni inštrumenti in oprema za električno in optično povezavo in prenos podatkov v letalstvu in vesoljski tehniki
Aerospace electric equipment and systems

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EUROPEAN STANDARD

EN 2591-306

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 1998

ICS 49.060

Descriptors: aircraft industry, aircraft equipment, connecting equipment, test

English version

Aerospace series - Elements of electrical and optical connection - Test methods - Part 306: Mould growth

Série aérospatiale - Organes de connexion électrique et
optique - Méthodes d'essais - Partie 306: Moisissures

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Verbindungselemente - Prüfverfahren - Teil 306:
Schimmelwachstum

This European Standard was approved by CEN on 22 June 1997.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

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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 December 1998, and conflicting national standards shall be withdrawn at the latest by December 1998.

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

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1 Scope

This standard specifies a method of assessing the ability of elements of connection or of samples of their component materials to withstand mould growth.

It shall be used together with EN 2591.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 2591	Aerospace series - Elements of electrical and optical connection - Test methods - General
EN 2591-101	Aerospace series - Elements of electrical and optical connection - Test methods - Part 101: Visual examination
EN 2591-206	Aerospace series - Elements of electrical and optical connection - Test methods - Part 206: Measurement of insulation resistance
EN 2591-207	Aerospace series - Elements of electrical and optical connection - Test methods - Part 207: Voltage proof test

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3 Preparation of specimens

3.1 Material samples

They shall be cleaned with products which shall not interfere with the subsequent growth of mould and shall be submitted to test method A.

3.2 Elements of connection

They shall be prepared as specified, shall not receive any preliminary cleaning treatment and shall be submitted to test method B.

3.3 Unless specified in the technical specification, the following details shall be stated:

- type of sampling;
- method to be used (A or B);
- period of exposure;
- extent of acceptable mould growth;
- preliminary cleaning (if applicable);
- initial measurements (if applicable);
- final measurements and requirements (if applicable).

4 Test preparation

4.1 Mould cultures

The following cultures (table 1) shall be used to carry out the test. The nature of the attack to be expected from each culture is indicated, but all strains shall be used together, whatever the nature of the specimen.

Table 1 - Cultures

Number	Name	Strain	Typical culture (for guidance only)	Nature
1	Aspergillus niger	V. Tieghem	ATCC.6275	Grows profusely on many materials and is resistant to copper salts
2	Aspergillus terreus	Thom.	PQMD.82j	Attacks plastic materials
3	Aureobasidium pullulans	(De Barry) Arnaud	ATCC.9348	Attacks paints and varnishes
4	Paecilomyces varioti	Bainier	IAM. 5001	Attacks plastics and leather
5	Penicillium funiculosum	Thom.	IAM. 7013	Attacks many materials especially textiles
6	Penicillium ochro-chloron	Blourge	ATCC. 9112	Resistant to copper salts and attacks plastics and textiles
7	Scopulariopsis brevicaulis	(Sacc.) Bain Var. Glabra Thom	IAM. 5146	Attacks rubber
8	Trichoderma viride	Pers. ex Fr.	IAM. 5061	Attacks cellulose textiles and plastics

Cultures shall be obtained from an approved mycological institute which shall certify that they are suitable for the test.

4.1.1 The cultures shall be supplied as spores, on an agar medium, in glass containers with cotton plugs, or as otherwise considered appropriate by the mycological institute.

4.1.2 The cultures shall be stored in a refrigerator at a temperature between 5 °C and 10 °C.

The cultures used for preparing the test suspension shall be preferably between 14 d and 21 d old. In no case shall cultures which are less than 14 d or more than 28 d old be used.

The stoppers shall not be removed until the suspension is about to be made, and only one suspension shall be made from the opened container.

A fresh, unopened container shall be used for each preparation of a suspension.

4.2 Preparation of spore suspension

4.2.1 The suspension shall be prepared in deionized water to which has been added 0,05 % of a non-fungicidal wetting agent.

An agent based on N-methyl or on dioctyl sodium sulphosuccinate may be accepted.

4.2.2 10 ml of the water with wetting agent shall be poured gently into each tube.

A platinum or a nichrome wire shall be sterilized by heating to red heat in a flame and allowed to cool. This wire shall then be used to scrape gently the surface of the culture to liberate spores. The liquid shall be slightly agitated to disperse the spores without detaching mycelial fragments. The suspension shall then be decanted into a flask.

4.2.3 All eight suspensions shall be shaken vigorously together in a flask to mix thoroughly and to break up any clumps of spores.

4.2.4 The suspension shall be used on the day of its preparation, and shall not be stored for future use.

4.3 Preparation of the nutrient solution

It shall consist of a solution of the following materials in distilled water. The quantities are amounts per litre of water.

Modified Czapek-Dox nutrient solution with saccharose

Potassium dihydrogen orthophosphate
(KH_2PO_4)

0,7 g

Potassium monohydrogen orthophosphate
(K_2HPO_4)

0,3 g

Magnesium sulphate
($\text{Mg SO}_4\cdot 7\text{H}_2\text{O}$)

0,5 g

Sodium nitrate
(NaNO_3)

0,2 g

Potassium chloride
(KCl)

0,5 g

Ferrous sulphate
($\text{FeSO}_4\cdot 7\text{H}_2\text{O}$)

0,01 g

Saccharose

30 g

The solution shall be sterilized in an autoclave at 115 °C for 30 min. The pH solution shall then be measured and adjusted, if necessary, by addition of a 0,01 N sodium hydroxide solution to obtain a pH between 6,0 and 6,5 after sterilization.

4.4 Control strips

They shall be made of white filter paper which has not been exposed to any fungicidal treatment.

They shall be placed in glass dishes and covered with the nutrient solution (see 4.3). They shall be removed from this solution and allowed to drain immediately before use.

The strips shall be prepared on the day the test commences.

A freshly prepared nutrient solution shall be used for preparing each group of control strips. These strips shall be sprayed with the same suspension as that used for the specimens.

5 Method

These tests shall only be carried out by approved laboratories.

All specimens, reference specimens and a group of three control strips shall be put in separate containers. All containers shall be placed together in the same test chamber.

The specimens and control strips shall be placed in the chamber within 15 min after spraying with spores. They shall not be unduly disturbed during the test, except for opening container lids and the chamber door each week.

The test chamber used shall maintain a temperature between 28 °C and 30 °C.

Any periodic variation in temperature due to action of the thermostat shall not exceed 1 °C/h.

Each specimen and control strip shall be put in a glass or plastic container (e.g. a Petri dish) with a lid.

The container shall permanently contain water to maintain a relative humidity greater than 90 % inside. The specimens shall not be immersed or splashed by the water.

The container lid shall be removed for a few seconds once per week to ensure a regular supply of oxygen in the air to the growing moulds.

The first opening shall be 7 d after spraying. If no mould growth is visible on any control strip, the test shall be considered invalid and shall be repeated.

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5.1 Initial measurements (if applicable)

They shall be carried out as specified.

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If mould growth on the control strips indicates that the conditions are suitable and the moulds viable, the test shall continue for the time specified.

If the chamber, or a container, becomes contaminated and must be cleaned, the preferred method is to heat it in a moisture saturated atmosphere at 120 °C for 1 h. Where heating is not possible, dry the chamber or the container and fumigate it with propylene oxide, finally washing it with water containing a detergent and ventilating it well to remove all oxide fumes.

5.2 Procedure

5.2.1 Method A

Expose the specimens to the suspensions which shall be supplied with a medium containing no assimilable carbon.

Mould growth can only take place to the detriment of the specimen component materials. If there are no edible materials, spores can not develop and there will be no attack.

The period of exposure shall be one of the following:

- 28 d: assessment of the mould growth by a single visual examination;
- 84 d: in addition to assessment of the mould growth, assessment of the damage due to mould growth by the specified measurements.

If 84 d exposure is specified, two groups of specimens shall be required:

- first group: specimens;
- second group: reference specimens for damp heat test.

The temperature and relative humidity conditions shall be identical for both tests, (mould growth and damp heat).

5.2.1.1 Sprayings

Sprayings shall be done with pipettes or spray guns depending on the nature of the spray, but with identical characteristics.

The nozzle, in particular, shall be large enough not to be blocked by fragments of mycelium.

5.2.1.2 Specimens (28 d or 84 d)

They shall be sprayed with the suspension according to 4.

5.2.2 Method B

Expose the specimens to the specified suspensions deposited on a nutrient medium allowing mould to grow previously applied to them. Even if the specimens do not have any nutrient elements, mould growth may progress as well as the action of the products of their metabolism.

The period of exposure (28 d or 84 d) shall be specified.

Regardless of the period of exposure, mould growth shall be assessed by visual examination and the damage to specimens by measurements.

Three groups of specimens are required:

- first group: specimens;
- second group: reference specimens for damp heat test;
- third group: laboratory reference specimens which shall not be exposed to any test and to be used as reference for visual examination.

The periods of exposure, the temperature and relative humidity conditions for the first group exposed to the mould growth test and the second group exposed to the damp heat test shall be identical.

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5.2.2.1 Sprayings

See 5.2.1.1.

5.2.2.2 Specimens

They shall be sprayed with a sufficient quantity of nutrient solution (see 4.3) and allowed to dry.

After drying, specimens shall be sprayed with the suspension (according to 4) on all their exposed surfaces.

5.2.2.3 Reference specimens for damp heat test

They shall be sprayed with an amount of sterile water containing a wetting agent equal to the amount of nutrient solution with suspension which has been sprayed on the specimens.

5.2.2.4 Control strips

See 4.4.

They shall be sprayed with a sufficient amount of nutrient solution and then allowed to dry.

After drying, strips shall be sprayed with the same suspension as that sprayed on the specimens.

The strips shall be tested at the same time and in the same test chamber as the specimens.