



SLOVENSKI STANDARD

SIST EN 14099:2004

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Space product assurance - Measurement of the peel and pull-off strength of coatings and finishes using pressure-sensitive tapes

Space product assurance - Measurement of the peel and pull-off strength of coatings and finishes using pressure-sensitive tapes

Raumfahrtproduktsicherung - Ermittlung der Schäl- und Abziehfestigkeit von Überzügen und Beschichtungen unter Anwendung von Haftbändern

Assurance produit des projets spatiaux - Mesure de la force d'arrachement des revêtements et apprêts de rubans auto-adhésifs

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Ta slovenski standard je istoveten z: EN 14099:2001

ICS:

49.040	Preveleke in z njimi povezani postopki, ki se uporabljajo v letalski in vesoljski industriji	Coatings and related processes used in aerospace industry
49.140	Vesoljski sistemi in operacije	Space systems and operations

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en

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EUROPEAN STANDARD

EN 14099

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2001

ICS 49.140

English version

Space product assurance - Measurement of the peel and pull-off strength of coatings and finishes using pressure-sensitive tapes

This European Standard was approved by CEN on 28 September 2001.

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 Management Centre 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 Management Centre 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

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EN 14099:2001 (E)**Foreword**

This European Standard has been prepared by CMC.

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 April 2002, and conflicting national standards shall be withdrawn at the latest by April 2002.

It is based on a previous version¹⁾ prepared by the ECSS Product Assurance Standards Working Group, reviewed by the ECSS Technical Panel and approved by the ECSS Steering Board. The European Cooperation for Space Standardization (ECSS) is a cooperative effort of the European Space Agency, National Space Agencies and European industry associations for the purpose of developing and maintaining common standards.

Requirements in this Standard are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

The formulation of this Standard takes into account the existing ISO 9000 family of documents.

Annex A is informative.

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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Introduction

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Surface coatings, such as thermal control paints and corrosion protection coatings, are affected, both on the ground and after launch, by exposure to the environment.

It is therefore important that the adhesion of the coating to the relevant substrate remains at an acceptable level after exposure to the relevant environmental condition.

¹⁾ ECSS-Q-70-13A.

1 Scope

This European Standard details a test in which pressure-sensitive tapes are used to assess the suitability of, for example, coatings, paints, films and other thin materials, proposed for use on spacecraft and associated equipment.

The following materials and assemblies are covered by this test method:

- organic coating, e.g. varnishes, paints and plastic films;
- metallic finishes on, for example, printed circuit boards, second-surface mirrors, thermal radiators, plastic films;
- adhesive layers;
- composite thin films;
- small assemblies, e.g. solar cells having attached glass covers.

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 (including amendments).

EN 13701, *Space systems - Glossary of terms*.

ECSS-Q-20A, *Space product assurance — Quality assurance*.

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ECSS-Q-70A, *Space product assurance — Materials, mechanical parts and processes*.

EN 14097, —²⁾, *Space product assurance — Nonconformance control system*.

ISO 14620-1, —²⁾, *Space systems – Safety requirements – Part 1: System safety*.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13701, ECSS-Q-70 and the following term and definition apply.

3.1.1

batch

quantity produced at one operation

3.2 Abbreviated terms

The following abbreviated term is defined and used within this European Standard.

Abbreviation	Meaning
RH	relative humidity

²⁾ To be published.

EN 14099:2001 (E)

4 Preparatory conditions**4.1 Hazards, health and safety precautions**

Materials and parts with hazardous characteristics shall be identified, managed and processed according to ISO 14620-1. Particular attention shall be given to health and safety precautions. In particular, hazards to personnel, equipment and materials shall be controlled and minimized.

4.2 Preparation of samples**4.2.1 Configuration**

- a) The material samples shall be prepared according to the relevant process specifications or manufacturer's data and shall be representative of batch variance.
- b) If it is not practicable to test completed assemblies, the manufacturer shall submit samples made from the same materials and by the same processes as those used in the manufacture of the assemblies.
- c) The sample for testing shall have clean flat surfaces which do not overlap the sample holder described in 4.4. The width of the test sample surface face shall be at least equal to the width of the tape used in the test procedure. The nominal tape width shall be 20 mm.
- d) The number of samples to be taken from a qualification batch, test programme, or production batch shall be specified at the start of the test in a material specification. Normally at least ten test samples shall be tested.
- e) If it is not practicable to obtain suitable test samples from the finished article, the supplier shall furnish bonded test samples (samples under strict control, that shall not be used other than for the designated test) suitable for the tests specified. The supplier shall furnish a certificate of conformance for the purpose of traceability. All test samples shall be marked with appropriate identification to maintain traceability but in such a way as not to degrade the quality of the sample during testing.

4.2.2 Cleaning

The cleaning and other treatments of the sample shall be the same as that applied to the finished article, which the sample is intended to represent, prior to integration into the spacecraft. Further cleaning or other treatments shall not be performed.

4.2.3 Handling and storage

Samples shall only be handled with clean nylon or lint-free gloves and shall be stored in a controlled area, with an ambient temperature of (22 ± 3) °C and relative humidity of (55 ± 10) %. Coated surfaces shall be shielded from contact by using polyethylene or polypropylene bags or sheets. Physical damage shall be avoided by packing the polyethylene or polypropylene-wrapped workpieces in clean, dust- and lint-free material. Limited-life materials shall be labelled with their shelf lives and dates of manufacture, or date of delivery if date of manufacture is not known.

4.2.4 Identification**4.2.4.1 Materials**

Materials submitted for testing shall be clearly identified with appropriate details to maintain traceability.

4.2.4.2 Assemblies

Assemblies submitted for testing shall be identified, as a minimum, by:

- a) trade name and batch number;
- b) name of manufacturer or supplier through whom the purchase was made;

c) configuration control status of the assembly.

4.3 Facilities

4.3.1 Cleanliness

The work area shall be nominally clean with minimum dust, but not necessarily a clean room environment. Air used for ventilation shall be nominally filtered to prevent contamination of the sample.

4.3.2 Sample conditioning

The sample shall be environmentally conditioned for a nominal 24 h period. Temperature shall be (22 ± 3) °C with a relative humidity of (55 ± 10) %. The humidity requirement can be achieved either in a conditioning room, or by desiccators filled with silica gel or a saturated salt solution.

NOTE A saturated salt solution of calcium nitrate gives approximately 51 % relative humidity at the testing temperature.

4.4 Equipment

4.4.1 Special equipment

The following special equipment shall be used.

a) Testing machine

A power-driven machine capable of maintaining a specified constant rate of loading and able to be used for both tensile and compressive testing shall be employed. The machine shall have a fixed or essentially stationary member supporting a load cell and the tape holder. A movable member shall carry the sample holder. The applied compressive and tensile loads, as measured and recorded, shall be accurate within 1 % of the load. The rate of travel of the sample holder shall be at a nominal rate of 0,2 cm/min.

b) Fixtures

The tape holder shall be of a design similar to that depicted in Figure 1. The part shall screw into the fixed member of the testing machine or be located firmly on it. A length of tape shall be clamped at both ends, the tape passing over and being in continuous contact with the flat surface of a rubber block having a loading face of $4 \text{ cm}^2 \pm 5 \%$.

4.4.2 Sample holder

The sample holder shall be firmly located beneath the tape holder on the movable member of the testing machine. A suitable design is seen in Figure 1. This preferred system utilizes 'top hat' supports onto which individual samples may be mechanically clamped or bonded in such a way that there is no relative movement between the support and the test sample at any time during the test cycle. This type of 'top hat' sample support shall slide into a horizontal fixture slot in such a way that its top surface is parallel to and directly beneath the rubber face of the tape holder.

4.4.3 Peel adhesion tape

A range of pressure-sensitive tapes shall be employed for the tests with peel adhesion strengths of 220, 330, 440 and 670 g/cm, all with a tolerance of $\pm 10 \%$.