SLOVENSKI STANDARD
SIST EN 14089:2004

01-maj-2004

Space product assurance - The control of limited shelf-life materials

Space product assurance - The control of limited shelf-life materials

Raumfahrtproduktsicherung - Kontrolle von Materialien mit begrenzter Lagerfähigkeit

Assurance produit des projets spatiaux - Contrôle des équipements a durée de vie limitée sur étagere

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Ta slovenski standard je istoveten z: **EN 14089:2002**

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ICS:

49.025.01	Materiali za letalsko in vesoljsko gradnjo na splošno	Materials for aerospace construction in general
49.140	Vesoljski sistemi in operacije	Space systems and operations

SIST EN 14089:2004 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 14089

May 2002

ICS 49.025.01; 49.140

English version

Space product assurance - The control of limited shelf-life materials

Assurance produit des projets spatiaux - Contrôle des équipements à durée de vie limitée sur étagère

Raumfahrtproduktsicherung - Kontrolle von Materialien mit begrenzter Lagerfähigkeit

This European Standard was approved by CEN on 24 January 2002.

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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.

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Foreword

This document EN 14089:2002 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of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

It is based on a previous version[1)] originally prepared by the ECSS product assurance 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.

This standard is one of the series of space standards intended to be applied together for the management, engineering and product assurance in space projects and applications.

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.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1) ECSS-Q-70-22A

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1 Scope

Several classes of material depend on a chemical reaction for their application and their final properties are sensitive to the exact composition of the reactants. The final properties vary with the reactants' age and storage condition.

This European Standard specifies the procedure to be used for the control of limited shelf-life materials employed in the fabrication of spacecraft and associated equipment.

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.*

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

EN 14099, *Space product assurance — Measurement of the peel and pull-off strength of coatings and finishes with pressure-sensitive tapes.*

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

EN 13291-2:— [2)], *Space product assurance — Quality assurance.*

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EN 13291-3:— [2)], *Space product assurance — Materials, mechanical parts and processes.*

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, EN 13192-3 and the following apply.

3.1.1
batch
quantity produced at one operation

NOTE One batch can be subdivided into several lots.

3.1.2
shelf-life
period of time during which a material can be processed to produce final properties if stored at specified conditions

[IEC 60194]

[2)] To be published.

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3.2 Abbreviated terms

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

Abbreviation	Meaning
RH	relative humidity

4 Control of material life

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 addition, hazards to personnel, equipment and materials shall be controlled and reduced to a minimum.

4.2 Material control

4.2.1 Procurement document

Procurement specifications or purchase orders shall require the manufacturer or supplier to declare the date of manufacture, required storage, transport and handling conditions in their unopened original packs and shelf-life of the products.

4.2.2 Identification

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Materials shall be clearly identified with the shelf-life and the date of the beginning of life or the date of manufacture (see 4.3). In addition, quantities which are split from a batch shall be fully traceable to it and bear the same date and life indications.

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4.2.3 Storage

Materials shall be stored in a nominally clean area at (22 ± 3) ºC with a relative humidity of (55 ± 10) % RH unless specified otherwise by the manufacturer or supplier. A wide range of pre-impregnated composites, adhesives and related materials which are used in the fabrication of spacecraft structures require controlled storage at lower temperatures to preserve their shelf-lives. Refer to 4.3.

Storage areas shall be organized and controlled in such a way that limited shelf-life items are clearly identified and handled to avoid the possibility of over-aged material being used.

4.2.4 Handling

Materials shall only be handled with clean lint-free or nylon gloves unless their use is precluded for reasons of safety, i.e. when handling corrosive, toxic and oxidizing substances.

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4.3 Assessment of shelf-life

a. The shelf-life of a material is generally stated by the manufacturer or supplier who accepts no liability on this point due to there being no way to determine control of storage and handling conditions after sale. In some critical applications, the project may reduce the shelf-life in order to meet particularly stringent product assurance requirements.

b. If the shelf-life cannot be obtained the material shall be certified at incoming inspection. Tests shall be performed relevant to the application of the material to ensure that the properties are within those values either specified within the procurement specification or in the manufacturer's data sheet (where no procurement specification exists). Where satisfactory results are obtained the material shall be deemed to have spent half its shelf-life at the time of delivery; if the results are not satisfactory the material shall be rejected. The date of manufacture and shelf-life shall appear on the label attached to limited shelf-life material (see 4.2.2).

c. The number of container openings shall always be kept to the minimum possible by ensuring that the quantity in each container is compatible with the planned short term usage. Decanting materials from larger into smaller containers shall be used where appropriate to avoid storage with large air space above the material.

d. For materials normally stored at low temperature (below zero), exposure to room temperature may dramatically reduce the shelf-life.

e. Users of such material shall define and implement a system to record the time exposed to room temperature and the consequent reduction in shelf-life when returned to low temperature storage.

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f. Care should be taken to ensure that all materials stored at temperatures below room temperature are allowed to attain room temperature prior to use.

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4.4 Extension of shelf-life (re-certification)

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a. Re-certification is permitted on condition that a material that has exceeded its shelf-life shall be submitted to the relevant tests described in 4.6, and if successful, shall be given an extension of shelf-life equal to half the initial shelf-life.

b. Re-certification may be performed one further time on a case-by-case basis depending on product, application, storage and user experience. This second extension of shelf-life shall be equal to half of the first extension.

c. If a fully traceable, non-over-aged batch is suspect, for any reason, it shall be submitted for re-certification.

d. Batches awaiting results of a re-certification process shall be stored separately and bear a "suspended" label indicating the status.

4.5 Disposal of non-certifiable materials

a. When further re-certification is not permitted, the material shall be disposed of in accordance with the product assurance rules applicable to the project.

b. If traceability has been lost for a batch, or part of a batch, disposal shall take place in accordance with the product assurance rules applicable to the project.

4.6 Acceptance criteria, re-certification testing

4.6.1 General

Re-certification of material shelf-life shall be achieved by retesting the material to verify that its properties are still within limits taking into account tolerances. The choice of property or properties to be measured is based on a combination of the final application of the material and its processing. As a

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minimum, retesting shall include those properties specified in the procurement specification or performed during incoming inspection. The choice of properties to be measured and test methods to be used are subject to the approval of product assurance.

4.6.2 Examples of properties to be tested

Examples of properties which may be measured in order to gain re-certification are:

a. Properties related to the individual components and the cure process that are particularly sensitive to the effects of ageing:

   1. molecular weight distribution as determined by gel permeation chromatography;
   2. molecular structure as determined by infrared spectroscopy;
   3. degree of cure, cure exotherm and glass transition temperature as determined by differential scanning calorimetry;
   4. measurement of pot life;
   5. measurement of resin flow characteristics, such as gel time (particularly important in the case of fibre reinforced materials);
   6. measurement of the degree of tackiness in the case of pre-impregnated materials.

b. Properties related to the materials application are measured on cured samples:

   1. adhesives - adhesive strength as determined by lap shear testing;
   2. coatings (paints and varnishes) - adhesion to the relevant substrate using measurements of peel and pull-off strength (see EN 14099);
   3. conformal coatings - hardness, adhesion properties;
   4. potting compounds - hardness, electrical or thermal characteristics;
   5. fibre-reinforced materials - resin/fibre/void content using chemical digestion techniques; measurement of relevant mechanical properties such as tensile strength or flexural strength.

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5 Quality assurance

5.1 Quality assurance requirements

The quality assurance requirements are defined in EN 13291-2. Particular attention shall be given to the following points.

5.2 Data

The quality records (e.g. logbooks shall be retained for at least ten years or in accordance with project contract requirements, and contain as a minimum the following:

a. supplier's certification and definition of required storage conditions;

b. copy of incoming inspection documentation;

c. nonconformance reports and corrective action (if applicable);

d. record of storage conditions and re-certification testing.