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Space product assurance - Durability testing of coatings and surface finishes

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 09/20

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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ICS 49.040; 49.140

English version

Space product assurance - Durability testing of coatings and surface finishes

Assurance produit des projets spatiaux - Essais de durabilité des revêtements et finitions de surface

Raumfahrtproduktsicherung - Dauerhaftigkeitsprüfung von Beschichtungen und Oberflächenbehandlungen

This European Standard was approved by CEN on 1 December 2019.

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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 and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Foreword

This document (EN 16602-70-17:2020) has been prepared by Technical Committee CEN/CLC/TC 5 “Space”, the secretariat of which is held by DIN (Germany).

This document (EN 16602-70-17:2020) originates from ECSS-Q-ST-70-17C.

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of an identical text or by endorsement, at the latest by October 2020, and conflicting national standards shall be withdrawn at the latest by October 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been developed to cover specifically space systems and will therefore have precedence over any EN covering the same scope but with a wider domain of applicability (e.g.: aerospace).

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Many different environmental factors can have an effect on coating durability for space applications. This includes in-orbit effects such as thermal cycling and particle radiation, as well as ground based effects such as cleaning, contamination and humidity. Space projects have typically been free to choose their own test requirements, based on a combination of existing standards and specific requirements for a given project. This approach can lead to ambiguous definitions about when a coating is “space qualified”. The supplier and customer often re-negotiate very general aspects of coating qualification for each new project. The intention of the present standard is to capture the best practice across the large range of existing national and international standards, in order to specify a minimum set of durability requirements for coating use in space applications. Information is also provided about some mission specific tests (including the atomic oxygen test, thermal ageing test, air-vacuum test and solar illumination test).

1 Scope

This standard specifies requirements for the durability testing of coatings most commonly used for space applications, i.e.:

- Thin film optical coatings
- Thermo-optical and thermal control coatings (the majority are paints, metallic deposits and coatings for stray light reduction)
- Metallic coatings for other applications (RF, electrical, corrosion protection)

This standard covers testing for both ground and in-orbit phases of a space mission.

This standard includes coatings within off the shelf items

This standard specifies the types of test to be performed for each class of coating, covering the different phases of a space project (evaluation, qualification and acceptance)

This standard does not cover:

- The particular qualification requirements for a specific mission
- Specific functional testing requirements for the different coating classes
- Test requirements for long term storage
- Solar cell cover glass coatings
- Surface treatments and conformal coatings applied on EEE parts

This standard may be tailored for the specific characteristic and constrains of a space project in conformance with ECSS-S-ST-00.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply. However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

EN reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS system – Glossary of terms
EN 16603-10-12	ECSS-E-ST-10-12	Space engineering – Method for the calculation of radiation received and its effects, and a policy for design margins
EN 16602-70-03	ECSS-Q-ST-70-03	Space product assurance- Black anodizing of metals with inorganic dyes
EN 16602-70-31	ECSS-Q-ST-70-31	Space product assurance- Application of paints and coatings on space hardware
	ISO 9211-4:2012	Optics and photonics – Optical coatings. Part 4: Specific test methods
	ISO 2409:2007	Paints and varnishes: Cross cut test
	ISO 4524-5:1985	Metallic coatings – Test methods for electrodeposited gold and gold alloy coatings – Part 5: Adhesion tests
	ISO 3696:1987	Water for analytical laboratory use— Specification and test methods
	ASTM B571-18	Standard practice for qualitative adhesion testing of metallic coatings
	ASTM D1193-06(2011)	Standard specification for reagent water