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Space engineering - Adhesive bonding for spacecraft and launcher applications

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

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English version

Space engineering - Adhesive bonding for spacecraft and launcher applications

Assurance produit des projets spatiaux - Utilisations du collage pour les structure satellites et lanceurs

Raumfahrtproduktsicherung - Adhäsionskleben für Raumfahrt- und Trägeranwendungen

This European Standard was approved by CEN on 22 February 2021.

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European Foreword

This document (EN 16602-70-16:2021) has been prepared by Technical Committee CEN-CENELEC/TC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16602-70-16:2021) originates from ECSS-Q-ST-70-16C.

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of an identical text or by endorsement, at the latest by April 2022, and conflicting national standards shall be withdrawn at the latest by April 2022.

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 prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association.

This document has been developed to cover specifically space systems and has therefore 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 organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Adhesive materials have a wide range of uses within the space domain however they are often qualified as a minor or negligible part of a large subsystem or system. This frequently results in unforeseen effects arising directly from the adhesive selection which impacts either the functionality, integrity or AIT activities. As a consequence whilst the adhesive is often the lowest cost element of the system it frequently has a high cost associated with the necessary recovery and delta qualification activities need to ensure the system level functionality. Both the system level qualification and any recovery actions are further complicated by the intrinsic relationship between the adhesive performance, the adherend and all the processes associated with the manufacture of the adhesive bond.

European space agencies and the space industry at present have a general handbook available for adhesive bonding (ECSS-E-HB-32-21) however there is no fixed scheme detailing the minimum requirements for verification of adhesive bonding process nor validation of an adhesive material.

Standardisation of the verification processes for adhesives and adhesive bonding across the European space industry is allowing a harmonised and consistent approach.

The generic approach facilitates the correct selection of data thus allowing streamlining of the industrial development activities and enabling the validation of adhesives and verification of adhesive bonding process at an early stage of a programmes lifetime.

This standard is further justified because of the high level of non-conformances (NCR) identified across industry due to limited early programmatic qualification programmes related to adhesive bonding and characterisation of adhesive materials.

1 Scope

The scope of the document addresses the generic verification for all types of adhesive bonding for space applications including evaluation phases. This standard covers all aspects of the adhesive bonding lifetime such as assembly, integration and testing, on-ground acceptance testing, storage, transport, pre-launch, launch and in-flight environments.

This standard does not cover requirements for:

- Adhesive bonding used in EEE mounting on printed circuit boards (for this subject see ECSS-Q-ST-70-61)
- Adhesive bonding used in hybrid manufacturing (for this subject see ESCC 2566000)
- Adhesive bonding for cover-glass on solar cell assemblies (for this subject see ECSS-E-ST-20-08)
- Design of adhesive joints (for this subject see ECSS-E-ST-32)
- Long term storage and long term storage sample testing
- Performance of adhesive bonds
- Functional properties of adhesive joints
- Co-curing processes
- Life-time aging prediction, neither on ground (humidity) nor in-orbit (thermal cycling)

This standard may be tailored for the specific characteristics 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 16603-32	ECSS-E-ST-32	Space engineering – Structural general requirements
EN 16602-10	ECSS-Q-ST-10	Space product assurance -Product assurance management
EN 16602-10-09	ECSS-Q-ST-10-09	Space product assurance -Nonconformance control system
EN 16602-20	ECSS-Q-ST-20	Space product assurance -Quality assurance
EN 16602-40	ECSS-Q-ST-40	Space product assurance - Safety
EN 16602-70	ECSS-Q-ST-70	Space product assurance – Materials, mechanical parts and processes
EN 16602-70-02	ECSS-Q-ST-70-02	Space product assurance - Thermal vacuum outgassing test for the screening of space materials
EN 16602-70-09	ECSS-Q-ST-70-09	Space product assurance - Measurements of thermo-optical properties of thermal control materials
EN 16602-70-22	ECSS-Q-ST-70-22	Space product assurance - Control of limited shelf-life materials
EN 16602-70-71	ECSS-Q-ST-70-71	Space product assurance - Materials, processes and their data selection
	ISO 472:2013/ Amd 1:2018	Plastics - Vocabulary - Amendment 1: Additional items
	ISO 3696:1987	Water for analytical laboratory use - Specification and test methods
	ISO 15785:2002	Technical drawings — Symbolic presentation and indication of adhesive, fold and pressed joints