



# SLOVENSKI STANDARD SIST EN 16602-60:2023

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## Zagotavljanje varnih proizvodov v vesoljski tehniki - Električne, elektronske in elektromehanske komponente

Space product assurance - Electrical, electronic and electromechanical (EEE) components

Space product assurance - Electrical, electronic and electromechanical (EEE) components

Assurance produit des projets spatiaux - Composants électriques, électroniques et électromécaniques (EEE)

**Ta slovenski standard je istoveten z: EN 16602-60:2023**

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## Space product assurance - Electrical, electronic and electromechanical (EEE) components

Assurance produit des projets spatiaux - Composants électriques, électroniques et électromécaniques (EEE)

Raumfahrtproduktsicherung - Elektrische, elektronische und elektromechanische (EEE) Bauteile

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## Table of contents

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|   |           |
|---|-----------|
| <b>European Foreword</b> .....                          | <b>7</b>  |
| <b>Introduction</b> .....                               | <b>7</b>  |
| <b>1 Scope</b> .....                                    | <b>9</b>  |
| <b>2 Normative references</b> .....                     | <b>10</b> |
| <b>3 Terms, definitions and abbreviated terms</b> ..... | <b>12</b> |
| 3.1 Terms from other standards.....                     | 12        |
| 3.2 Terms specific to the present standard .....        | 12        |
| 3.3 Abbreviated terms.....                              | 13        |
| 3.4 Conventions.....                                    | 15        |
| 3.5 Nomenclature .....                                  | 16        |
| <b>4 Requirements for Class 1 components</b> .....      | <b>17</b> |
| 4.1 Component programme management .....                | 17        |
| 4.1.1 General .....                                     | 17        |
| 4.1.2 Components control programme .....                | 17        |
| 4.1.3 Parts control board.....                          | 17        |
| 4.1.4 Declared components list.....                     | 18        |
| 4.1.5 Electrical and mechanical GSE .....               | 19        |
| 4.1.6 EQM components .....                              | 19        |
| 4.2 Component selection, evaluation and approval.....   | 20        |
| 4.2.1 General .....                                     | 20        |
| 4.2.2 Manufacturer and component selection.....         | 20        |
| 4.2.3 Component evaluation .....                        | 24        |
| 4.2.4 Parts approval.....                               | 26        |
| 4.3 Component procurement .....                         | 27        |
| 4.3.1 General .....                                     | 27        |
| 4.3.2 Procurement specification .....                   | 27        |
| 4.3.3 Screening requirements .....                      | 28        |
| 4.3.4 Initial customer source inspection (precap) ..... | 28        |
| 4.3.5 Lot acceptance.....                               | 29        |

|          |  |           |
|----------|--|-----------|
| 4.3.6    | Final customer source inspection (buy-off).....    | 30        |
| 4.3.7    | Incoming inspections.....                          | 30        |
| 4.3.8    | Radiation verification testing .....               | 31        |
| 4.3.9    | Destructive physical analysis .....                | 31        |
| 4.3.10   | Relifing.....                                      | 32        |
| 4.3.11   | Manufacturer's data documentation deliveries ..... | 32        |
| 4.4      | Handling and storage.....                          | 33        |
| 4.5      | Component quality assurance .....                  | 33        |
| 4.5.1    | General.....                                       | 33        |
| 4.5.2    | Nonconformances or failures .....                  | 33        |
| 4.5.3    | Alerts.....  | 34        |
| 4.5.4    | Traceability .....                                 | 34        |
| 4.5.5    | Lot homogeneity for sampling test.....             | 35        |
| 4.6      | Specific components.....                           | 35        |
| 4.6.1    | General.....                                       | 35        |
| 4.6.2    | ASICs.....   | 35        |
| 4.6.3    | Hybrids.....                                       | 35        |
| 4.6.4    | One time programmable devices.....                 | 35        |
| 4.6.5    | Microwave monolithic integrated circuits .....     | 36        |
| 4.6.6    | Connectors .....                                   | 36        |
| 4.7      | Documentation .....                                | 36        |
| <b>5</b> | <b>Requirements for Class 2 components .....</b>   | <b>38</b> |
| 5.1      | Component programme management .....               | 38        |
| 5.1.1    | General.....                                       | 38        |
| 5.1.2    | Components control programme .....                 | 38        |
| 5.1.3    | Parts Control Board.....                           | 38        |
| 5.1.4    | Declared Components List.....                      | 39        |
| 5.1.5    | Electrical and mechanical GSE .....                | 40        |
| 5.1.6    | EQM components .....                               | 40        |
| 5.2      | Component selection, evaluation and approval.....  | 40        |
| 5.2.1    | General.....                                       | 40        |
| 5.2.2    | Manufacturer and component selection.....          | 41        |
| 5.2.3    | Component evaluation .....                         | 44        |
| 5.2.4    | Parts approval.....                                | 46        |
| 5.3      | Component procurement .....                        | 46        |
| 5.3.1    | General.....                                       | 46        |
| 5.3.2    | Procurement specification .....                    | 47        |

**EN 16602-60:2023 (E)**

|          |  |           |
|----------|--|-----------|
| 5.3.3    | Screening requirements .....                       | 47        |
| 5.3.4    | Initial Customer Source Inspection (precap).....   | 48        |
| 5.3.5    | Lot acceptance.....                                | 48        |
| 5.3.6    | Final customer source inspection (buy-off).....    | 49        |
| 5.3.7    | Incoming inspections.....                          | 49        |
| 5.3.8    | Radiation verification testing .....               | 50        |
| 5.3.9    | Destructive physical analysis .....                | 50        |
| 5.3.10   | Relifing.....                                      | 51        |
| 5.3.11   | Manufacturer's data documentation deliveries ..... | 51        |
| 5.4      | Handling and storage.....                          | 52        |
| 5.5      | Component quality assurance .....                  | 52        |
| 5.5.1    | General .....                                      | 52        |
| 5.5.2    | Nonconformances or failures .....                  | 52        |
| 5.5.3    | Alerts.....  | 53        |
| 5.5.4    | Traceability .....                                 | 53        |
| 5.5.5    | Lot homogeneity for sampling test.....             | 53        |
| 5.6      | Specific components.....                           | 53        |
| 5.6.1    | General .....                                      | 53        |
| 5.6.2    | ASICs.....   | 53        |
| 5.6.3    | Hybrids.....                                       | 54        |
| 5.6.4    | One time programmable devices.....                 | 54        |
| 5.6.5    | Microwave monolithic integrated circuits .....     | 55        |
| 5.6.6    | Connectors .....                                   | 55        |
| 5.7      | Documentation .....                                | 55        |
| <b>6</b> | <b>Requirements for Class 3 components .....</b>   | <b>57</b> |
| 6.1      | Component programme management .....               | 57        |
| 6.1.1    | General.....                                       | 57        |
| 6.1.2    | Components control programme .....                 | 57        |
| 6.1.3    | Parts control board.....                           | 57        |
| 6.1.4    | Declared components list.....                      | 57        |
| 6.1.5    | Electrical and mechanical GSE .....                | 58        |
| 6.1.6    | EQM components .....                               | 58        |
| 6.2      | Component selection, evaluation and approval.....  | 58        |
| 6.2.1    | General.....                                       | 58        |
| 6.2.2    | Manufacturer and component selection.....          | 59        |
| 6.2.3    | Component evaluation .....                         | 62        |
| 6.2.4    | Parts approval.....                                | 64        |

|                            |  |           |
|----------------------------|--|-----------|
| 6.3                        | Component procurement .....                                  | 65        |
| 6.3.1                      | General .....  | 65        |
| 6.3.2                      | Procurement specification .....                              | 65        |
| 6.3.3                      | Screening requirements .....                                 | 65        |
| 6.3.4                      | Initial customer source inspection (precap) .....            | 66        |
| 6.3.5                      | Lot acceptance.....  | 66        |
| 6.3.6                      | Final customer source inspection (buy-off).....              | 66        |
| 6.3.7                      | Incoming inspections.....                                    | 67        |
| 6.3.8                      | Radiation verification testing .....                         | 67        |
| 6.3.9                      | Destructive physical analysis .....                          | 67        |
| 6.3.10                     | Relifing.....  | 68        |
| 6.3.11                     | Manufacturer's data documentation deliveries .....           | 69        |
| 6.4                        | Handling and storage.....                                    | 69        |
| 6.5                        | Component quality assurance .....                            | 69        |
| 6.5.1                      | General .....  | 69        |
| 6.5.2                      | Nonconformances or failures .....                            | 70        |
| 6.5.3                      | Alerts.....  | 70        |
| 6.5.4                      | Traceability .....   | 70        |
| 6.5.5                      | Lot homogeneity for sampling test.....                       | 71        |
| 6.6                        | Specific components.....                                     | 71        |
| 6.6.1                      | Overview.....  | 71        |
| 6.6.2                      | ASICs.....   | 71        |
| 6.6.3                      | Hybrids.....   | 71        |
| 6.6.4                      | One time programmable devices.....                           | 71        |
| 6.6.5                      | Microwave monolithic integrated circuits .....               | 72        |
| 6.6.6                      | Connectors .....   | 72        |
| 6.7                        | Documentation .....  | 72        |
| <b>7</b>                   | <b>Quality levels .....</b>                                  | <b>74</b> |
| <b>8</b>                   | <b>Evaluation and lot acceptance for retinned parts.....</b> | <b>88</b> |
| <b>9</b>                   | <b>Pure tin lead finish – risk analysis .....</b>            | <b>89</b> |
| 9.1                        | Overview .....   | 89        |
| 9.2                        | Requirements .....   | 89        |
| <b>Annex A (normative)</b> | <b>Component control plan (CCP) - DRD .....</b>              | <b>91</b> |
| A.1.1                      | Requirement identification and source document.....          | 91        |
| A.1.2                      | Purpose and objective.....                                   | 91        |
| A.2.1                      | Scope and content .....                                      | 91        |

**EN 16602-60:2023 (E)**

|                              |   |            |
|------------------------------|---|------------|
| A.2.2                        | Special remarks .....                                   | 92         |
| <b>Annex B (normative)</b>   | <b>Declared component list (DCL) - DRD .....</b>        | <b>93</b>  |
| B.1.1                        | Requirement identification and source document.....     | 93         |
| B.1.2                        | Purpose and objective.....                              | 93         |
| B.2.1                        | Scope and content .....                                 | 93         |
| B.2.2                        | Special remarks .....                                   | 94         |
| <b>Annex C (normative)</b>   | <b>Procurement specification - DRD .....</b>            | <b>95</b>  |
| C.1.1                        | Requirement identification and source document.....     | 95         |
| C.1.2                        | Purpose and objective.....                              | 95         |
| C.2.1                        | Scope and content .....                                 | 95         |
| C.2.2                        | Special remarks .....                                   | 96         |
| <b>Annex D (normative)</b>   | <b>Part approval document (PAD) - DRD .....</b>         | <b>97</b>  |
| D.1.1                        | Requirement identification and source document.....     | 97         |
| D.1.2                        | Purpose and objective.....                              | 97         |
| <b>Annex E (informative)</b> | <b>EEE documents delivery per review .....</b>          | <b>100</b> |
| <b>Bibliography</b> .....    |   | <b>103</b> |
| <b>Tables</b>                |   |            |
| Table 4-1:                   | Document requirements list for Class 1 components ..... | 36         |
| Table 5-1:                   | Document requirements list for Class 2 components ..... | 55         |
| Table 6-1:                   | Document requirements list for Class 3 components ..... | 72         |
| Table 7-1:                   | Quality levels for Class 1 components .....             | 74         |
| Table 7-2:                   | Quality levels for Class 2 components .....             | 78         |
| Table 7-3:                   | Quality levels for Class 3 components .....             | 83         |
| Table D-1 :                  | PAD sheet.....  | 98         |
| Table E-1 :                  | EEE delivery documents .....                            | 101        |



## European Foreword

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This document (EN 16602-60:2023) has been prepared by Technical Committee CEN-CENELEC/JTC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-60:2023) originates from ECSS-Q-ST-60C Rev. 3.

This document will supersede EN 16602-60:2015.

The main changes with respect to EN 16602-60:2015 are listed below:

- Implementation of Change Requests
- Topic "EQM components" added for all three classes
- Topic "Pure tin lead finish – risk analysis" moved from ECSS-Q-ST-60-13 to ECSS-Q-ST-60 as clause 9. Definition of "traceability information (trace code)" updated"

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).

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# Introduction

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The objective of the EEE component selection, control, procurement and use requirements is to ensure that EEE components used in a space project enables the project to meet its mission requirements.

Important elements of EEE component requirements include:

- a. component programme management,
- b. component selection, evaluation and approval,
- c. procurement,
- d. handling and storage,
- e. component quality assurance,
- f. specific components, and
- g. documentation.

The main tools which can be used to reach the objective are:

- a. concurrent engineering,
- b. standardization of component types,
- c. characterization of components,
- d. assessment of component manufacturers including declared competencies and processes,
- e. testing, screening, lot acceptance and periodic testing,
- f. procurement specifications,
- g. control and inspection,
- h. control of nonconforming materials,
- i. assessment and use of existing component data,
- j. application of specific control to mitigate risk for components with limited data or confidence, and
- k. information management.

The basic approach is as follows:

- The customer of a given space project defines the EEE component requirements within the boundaries of this standard. They appear in the appropriate clauses of the project requirements as defined in ECSS-M-ST-10.
- The supplier defines a component control plan to implement those requirements into a system which enables, for instance, to control the selection, approval, procurement, handling in a schedule compatible with his requirements, and in a cost-efficient way.
- The supplier ensures that the applicable parts requirements are passed down to lower level suppliers and ensure that they are compliant to these parts requirements.

# 1 Scope

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This standard defines the requirements for selection, control, procurement and usage of EEE components for space projects.

This standard differentiates between three classes of components through three different sets of standardization requirements (clauses) to be met.

The three classes provide for three levels of trade-off between assurance and risk. The highest assurance and lowest risk is provided by class 1 and the lowest assurance and highest risk by class 3. Procurement costs are typically highest for class 1 and lowest for class 3. Mitigation and other engineering measures may decrease the total cost of ownership differences between the three classes. The project objectives, definition and constraints determine which class or classes of components are appropriate to be utilised within the system and subsystems.

- a. Class 1 components are described in Clause 4.
- b. Class 2 components are described in Clause 5
- c. Class 3 components are described in Clause 6.

The requirements of this document apply to all parties involved at all levels in the integration of EEE components into space segment hardware and launchers.

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

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## 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 16601-10    | ECSS-M-ST-10      | Space project management – Project planning and implementation  |
| 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 16602-30-11 | ECSS-Q-ST-30-11   | Space product assurance – Derating – EEE components   |
| EN 16602-60-02 | ECSS-Q-ST-60-02   | Space product assurance – ASIC and FPGA development   |
| EN 16602-60-05 | ECSS-Q-ST-60-05   | Space product assurance – Generic procurement requirements for hybrids  |
| EN 16602-60-12 | ECSS-Q-ST-60-12   | Space product assurance – Design, selection, procurement and use of die form monolithic microwave integrated circuits (MMICs) |
| EN 16602-60-13 | ECSS-Q-ST-60-13   | Space product assurance – Commercial electrical, electronic and electromechanical (EEE) components                            |
| EN 16602-60-14 | ECSS-Q-ST-60-14   | Space product assurance – Relieving procedure – EEE components  |
| EN 16602-60-15 | ECSS-Q-ST-60-15   | Radiation hardness assurance – EEE components   |
| EN 16602-70    | ECSS-Q-ST-70      | Space product assurance – Materials, mechanical parts and processes   |
|                | ESCC 20200        | ESCC Basic Specification: Component Manufacturer Evaluation   |
|                | ESCC 21004        | ESCC Basic Specification: Guidelines for incoming inspection of EEE components  |
|                | ESCC 22500        | ESCC Basic Specification: Guidelines for displacement damage irradiation testing  |

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|  | ESCC 22800   | ESCC Basic Specification: ESA/SCC Non conformance Control System   |
|  | ESCC 22900   | ESCC Basic Specification: Total Dose Steady-State Irradiation Test Method  |
|  | ESCC 24900   | ESCC Basic Specification: Minimum requirements for controlling environmental contamination of components                               |
|  | ESCC 25500   | ESCC Basic Specification: Methodology for the detection of pure tin in the external surface finish of case and leads of EEE components |
|  | ESCC QPL   | ESCC qualified part list ( <a href="https://escies.org">https://escies.org</a> )   |
|  | ESCC EPPL  | ESCC European preferred parts list ( <a href="https://escies.org">https://escies.org</a> )   |
|  | ESCC QML   | ESCC qualified manufacturers list ( <a href="https://escies.org">https://escies.org</a> )  |
|  | GEIA-STD-0005-2  | Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems.                              |
|  | MIL QPLs   | MIL qualified parts lists  |
|  | MIL QMLs   | MIL qualified manufacturers lists  |
|  | NPSL   | NASA Parts Selection List  |
|  | JAXA QPL   | JAXA qualified parts list  |
|  | ESCC, MIL & JAXA specifications and standards called in the document |  |

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## Terms, definitions and abbreviated terms

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### 3.1 Terms from other standards

For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 apply.

### 3.2 Terms specific to the present standard

#### 3.2.1 agent

organization contracted to perform the procurement of EEE components including related engineering and quality assurance tasks

#### 3.2.2 characterization

determination of the attributes of an EEE component, in sufficient detail to allow assessment of its suitability for a particular use or application

#### 3.2.3 commercial component

part neither designed, nor manufactured with reference to military or space standards

#### 3.2.4 concurrent engineering

engineering activity taking place in the context of simultaneous design of the product, the production process and all associated product usages, in an integrated, multifunctional team, with external organizational constraints minimized

#### 3.2.5 destructive physical analysis

series of inspections, tests and analyses performed on a sample of components to verify that the material, design and workmanship used for its construction, as well as the construction itself, meet the requirements of the relevant specification and are suitable for the intended application

#### 3.2.6 franchised distributor

distributor officially and contractually authorised by the manufacturer

#### 3.2.7 parts engineer

professional engineer with demonstratable specialisation in EEE components

#### 3.2.8 parts procurer

supplier who procures components by himself or a parts procurement agent who procures parts for the supplier

**3.2.9 qualified parts**

parts belonging to QPLs or QMLs from the following normative systems: ESCC, MIL, JAXA, CECC

**3.2.10 screening**

tests, inspections or combination thereof, imposed on 100% of parts, to remove unsatisfactory items or those likely to exhibit early failures

**3.2.11 space qualified parts**

parts belonging to QPLs or QMLs from the following normative systems (ESCC, MIL) according to quality levels listed in Table 7-1

NOTE 1 Space qualified parts are a subset of the qualified parts defined in clause 3.2.9.

NOTE 2 Parts belonging to JAXA QPL are considered as space qualified provided the equivalence of the generic JAXA specification with the ESCC or MIL generic specifications has been established.

**3.3 Abbreviated terms**

For the purpose of this Standard, the abbreviated terms from ECSS-S-ST-00-01 and the following apply:

| <b>Abbreviation</b> | <b>Meaning</b>                                    |
|---------------------|---|
| ASIC                | Application specific integrated circuit           |
| CCD                 | charge coupled device                             |
| CCP                 | Component control plan                            |
| CDR                 | critical design review                            |
| CECC                | CENELEC electronic components committee           |
| CENELEC             | Comité Européen de Normalisation Electrotechnique |
| CI                  | conformance inspection                            |
| CN                  | change notice                                     |
| CoC                 | certificate of conformance                        |
| CPPA                | centralized parts procurement agent               |
| CR                  | change request                                    |
| CSI                 | customer source inspection                        |
| CSV                 | comma-separated values                            |
| DCL                 | declared components list                          |
| DPA                 | destructive physical analysis                     |
| DRD                 | document requirement definition                   |
| EEE                 | electrical, electronic, electromechanical         |
| EFR                 | established failure rate                          |
| EPPL                | European preferred parts list                     |
| ESCC                | European space components coordination            |