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Space engineering - Mechanisms

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

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# EUROPEAN STANDARD
# NORME EUROPÉENNE
# EUROPÄISCHE NORM

**EN 16603-33-01**

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English version

## Space engineering - Mechanisms

Ingénierie spatiale - Mécanismes

Raumfahrttechnik - Mechanik/Mechanismen

This European Standard was approved by CEN on 7 October 2018.

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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 16603-33-01:2019) has been prepared by Technical Committee CEN-CENELEC/TC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16603-33-01:2019) originates from ECSS-E-ST-33-01C Rev.1.

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of an identical text or by endorsement, at the latest by October 2019, and conflicting national standards shall be withdrawn at the latest by October 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] 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

This document has been established to provide mechanism engineering teams with a set of requirements, design rules and guidelines based on the state of the art knowledge and experience in the field of space mechanisms.

The use of this document helps mechanisms developers to establish generic mechanisms designs and to derive application specific requirements.

The main objectives are to achieve reliable operation of space mechanisms in orbit and to prevent anomalies during the development phase influencing schedule and cost efficiency of space programmes.

# 1 Scope

This Standard specifies the requirements applicable to the concept definition, design, analysis, development, production, test verification and in-orbit operation of space mechanisms on spacecraft and payloads in order to meet the mission performance requirements.

This version of the standard has not been produced with the objective to cover also the requirements for mechanisms on launchers. Applicability of the requirements contained in this current version of the standard to launcher mechanisms is a decision left to the individual launcher project.

Requirements in this Standard are defined in terms of what shall be accomplished, rather than in terms of how to organise 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. Complementary non-ECSS handbooks and guidelines exist to support mechanism design.

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 revisions 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 most 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 16603-10-02 | ECSS-E-ST-10-02 | Space engineering – Verification |
| EN 16603-20 | ECSS-E-ST-20 | Space engineering – Electrical and electronic |
| EN 16603-06 | ECSS-E-ST-20-06 | Space engineering – Spacecraft charging |
| EN 16603-07 | ECSS-E-ST-20-07 | Space engineering – Electromagnetic compatibility |
| EN 16603-31 | ECSS-E-ST-31 | Space engineering – Thermal control general requirements |
| EN 16603-32 | ECSS-E-ST-32 | Space engineering – Structural |
| EN 16603-32-01 | ECSS-E-ST-32-01 | Space engineering – Fracture control |
| EN 16603-32-10 | ECSS-E-ST-32-10 | Space engineering – Structural factors of safety for spaceflight hardware |
| EN 16603-33-11 | ECSS-E-ST-33-11 | Space engineering – Explosive systems and devices |
| EN 16602-30 | ECSS-Q-ST-30 | Space product assurance - Dependability |
| EN 16602-40 | ECSS-Q-ST-40 | Space product assurance – Safety |
| EN 16602-70 | ECSS-Q-ST-70 | Space product assurance – material, mechanical part and process |
| EN 16602-70-36 | ECSS-Q-ST-70-36 | Space product assurance – Material selection for controlling stress corrosion cracking |
| EN 16602-70-37 | ECSS-Q-ST-70-37 | Space product assurance – Determination of the susceptibility of metals to stress corrosion cracking |
| EN 16602-70-71 | ECSS-Q-ST-70-71 | Space product assurance – Data for selection of space materials and processes |
| | ISO 76 (2006) | Rolling bearings – Static load rating |
| | ISO 128 (1996) | Technical drawings |

| EN reference | Reference in text | Title |
|---|---|---|
| | ISO 677 (1976) | Straight bevel gears for general engineering and for heavy engineering – Basic rack |
| | ISO 678 (1976) | Straight bevel gears for general engineering and for heavy engineering – Modules and diametral pitches |
| | ISO 6336-1 (2006) | Calculation of the load capacity of spur and helical gears — Part 1: Basic principles, introduction and general influence factors |
| | ISO 6336-2 (2006) | Calculation of the load capacity of spur and helical gears — Part 2: Calculation of surface durability (pitting) |
| | ISO 6336-3 (2006) | Calculation of the load capacity of spur and helical gears — Part 3: Calculation of tooth bending strength |