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Space product assurance - Processing and quality assurance requirements for metallic powder bed fusion technologies for space applications

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

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## Space product assurance - Processing and quality assurance requirements for metallic powder bed fusion technologies for space applications

Assurance produit des projets spatiaux - Exigences de traitement et d'assurance qualité pour les technologies de fusion sur lit de poudre métallique pour applications spatiales

Raumfahrtproduktsicherung - Verarbeitungs- und Qualitätssicherungsanforderungen für metallische Pulver-Bett-Fusions-Technologien für Weltraumanwendungen

This European Standard was approved by CEN on 5 December 2021.

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# European Foreword

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This document (EN 16602-70-80:2021) has been prepared by Technical Committee CEN-CENELEC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-70-80:2021) originates from ECSS-Q-ST-70-80C.

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of an identical text or by endorsement, at the latest by June 2022, and conflicting national standards shall be withdrawn at the latest by June 2022.

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

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This Standard specifies the processing and quality assurance requirements for the different types of Powder Bed Fusion (PBF) Additive Manufacturing processes for Metallic Materials for space flight applications. It can also be used for Additive Manufacturing activities on space related ground equipment and development activities for flight hardware. The Standard covers all Powder Bed Additive Manufacturing processes using Laser or Electron Beam as melting source.

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

# 1

## Scope

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This Standard defines requirements for processing and quality assurance of powder bed fusion technologies for space applications.

Within this standard a set of phases are specified, each to be followed when defining, verifying and manufacturing parts using metallic powder bed fusion technologies. In addition, requirements for operating and supervision personnel and equipment facilities are described.

This Standard does not aim to prescribe process parameters relevant to the fabrication using metallic powder bed fusion technologies.

Although this standard is developed for powder bed fusion based techniques, its principles can also be used as a reference for other metal-based and polymer-based processes. These include Wire Arc Additive Manufacturing (WAAM), Stereolithography (with metals), Binder Jetting, but also Selective Laser Sintering (SLS), Stereolithography (with polymers), Fused Deposition Modelling (FDM), and others.

## 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 16602-10-09	ECSS-Q-ST-10-09	Space product assurance - Nonconformance control system
EN 16602-20	ECSS-Q-ST-20	Space product assurance - Quality assurance
EN 16602-70	ECSS-Q-ST-70	Space product assurance - Materials, mechanical parts and processes
EN 16602-70-15	ECSS-Q-ST-70-15	Space product assurance - Non-destructive testing
EN 16602-70-45	ECSS-Q-ST-70-45	Space product assurance -Mechanical testing of metallic materials
	EN 2003-009:2007	Aerospace series - Test methods - Titanium and titanium alloys - Part 009: Determination of surface contamination
	EN ISO ASTM 52921:2016	Standard terminology for additive manufacturing - Coordinate systems and test methodologies
	ISO 2859-1:1999	Sampling procedures for inspection by attributes, Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
	ISO ASTM 52941:2020	Additive manufacturing - System performance and reliability - Acceptance tests for laser metal powder-bed fusion machines for metallic materials for aerospace application
	ISO ASTM 52942:2020	Additive manufacturing - Qualification principles - Qualifying machine operators of laser metal powder bed fusion machines and equipment used in aerospace applications

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**