



BSI Standards Publication

## Space engineering — Cleanliness requirements for spacecraft propulsion hardware

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## National foreword

This British Standard is the UK implementation of EN 16603-35-06:2022. It supersedes BS EN 16603-35-06:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/68, Space systems and operations.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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## Space engineering - Cleanliness requirements for spacecraft propulsion hardware

Ingénierie spatiale - Exigences de propreté du matériel de propulsion des engins spatiaux

Raumfahrttechnik - Sauberkeitsanforderungen für die Antriebstechnik von Raumfahrzeugen

This European Standard was approved by CEN on 20 April 2022.

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This document (EN 16602-20-07:2016) has been prepared by Technical Committee CEN-CENELEC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-20-07:2016) originates from ECSS-Q-ST-20-07C.

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of an identical text or by endorsement, at the latest by January 2023, and conflicting national standards shall be withdrawn at the latest by January 2023.

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 supersedes EN 16603-35-06:2014.

The main changes with respect to EN 16603-35-06:2014 are listed below:

- Implementation of Change Requests received to the ECSS equivalent standard
- Addition of the Nomenclature in clause 3.5
- Definition of "accuracy" deleted in 3.2 and reference to ECSS-S-ST-00-01 made in 3.1
- Definition "condensable hydrocarbon" and "dewar" deleted in clause 3.2 as they were not used in the standard
- Added requirements 6.4.3d.
- Modified requirements: 4.1h Note 2 (reference to Figure of other ECSS Standard corrected); 6.2.6.2a; 6.4.3a; 6.4.3c; 12.1a; 12.2c Note to item 10 moved to the end of the requirement.
- Interleaved Notes in requirement 12.1a move to the end of the requirement
- Cross-reference in Annex B.1.1 to added requirement 6.4.3d created
- Caption of Table in Annex D corrected from "Table A-1" to "Table D-1".

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.



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## Scope

ECSS-E-ST-35-06 belongs to the Propulsion field of the mechanical discipline, and concerns itself with the cleanliness of propulsion components, sub-systems and systems

The standard

- defines design requirements which allow for cleaning of propulsion components sub-systems and systems and which avoid generation or unwanted collection of contamination,
- identifies cleanliness requirements (e.g. which particle / impurity / wetness level can be tolerated),
- defines requirements on cleaning to comply with the cleanliness level requirements, and the requirements on verification,
- identifies the cleanliness approach, cleaning requirements, (e.g. what needs to be done to ensure the tolerable level is not exceeded, compatibility requirements),
- identifies, specifies and defines the requirements regarding conditions under which cleaning or cleanliness verification takes place (e.g. compatibility, check after environmental test).

The standard is applicable to the most commonly used propulsion systems and their related storable propellant combinations: Hydrazine ( $N_2H_4$ ), Mono Methyl Hydrazine ( $CH_3N_2H_3$ ), MON (Mixed Oxides of Nitrogen), Nitrogen ( $N_2$ ), Helium (He), Propane ( $C_3H_8$ ), Butane ( $C_4H_{10}$ ) and Xenon (Xe).

This standard is the basis for the European spacecraft and spacecraft propulsion industry to define, achieve and verify the required cleanliness levels in spacecraft propulsion systems.

This standard is particularly applicable to spacecraft propulsion as used for satellites and (manned) spacecraft and any of such projects including its ground support equipment.

External cleanliness requirements, e.g. outside of tanks, piping and aspects such as fungus and outgassing are covered by ECSS-Q-ST-70-01.

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