

**Space engineering - Cleanliness requirements for
spacecraft propulsion hardware**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16603-35-06:2014 sisaldab Euroopa standardi EN 16603-35-06:2014 inglisekeelset teksti.	This Estonian standard EVS-EN 16603-35-06:2014 consists of the English text of the European standard EN 16603-35-06:2014.
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English version

Space engineering - Cleanliness requirements for spacecraft propulsion hardware

Ingénierie spatiale - Exigences de propreté des éléments de propulsion des véhicules spatiaux

Raumfahrttechnik - Sauberkeitsanforderungen für die Antriebstechnik von Raumfahrzeugen

This European Standard was approved by CEN on 1 March 2014.

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Table of contents

Foreword	6
1 Scope	7
2 Normative references	8
3 Terms, definitions and abbreviated terms	10
3.1 Terms from other standards	10
3.2 Terms specific to the present standard	10
3.3 Abbreviated terms	13
3.4 Symbols	13
4 Cleanliness requirements	14
4.1 General	14
4.2 Design requirements	15
4.2.1 General	15
4.2.2 Components	15
4.2.3 System	17
4.2.4 Ground support equipment (GSE)	17
4.3 Manufacturing	18
4.3.1 General	18
4.3.2 Manufacturing processes	18
4.3.3 Machined parts	18
4.3.4 Tubing and manifolds	18
4.3.5 Components	20
4.3.6 Subsystems and systems	21
4.3.7 Final rinsing solutions	21
4.4 Cleanliness classes definition	22
4.4.1 Particulate	22
4.4.2 Non-volatile residues (NVR)	25
4.4.3 Dryness and liquid residuals	25
4.4.4 Requirements on process fluids to meet cleanliness classes	26
4.5 Test methods	27

4.6	Code usage	27
5	Cleaning techniques	28
5.1	General.....	28
5.2	Environment, health and safety.....	29
5.2.1	General	29
5.2.2	Hardware configuration requirements.....	29
5.2.3	Cleaning process approval.....	30
5.3	Pre-cleaning	30
5.3.1	General	30
5.3.2	Mechanical pre-cleaning	30
5.3.3	Chemical pre-cleaning	31
5.4	Precision cleaning.....	32
5.4.1	General	32
5.4.2	Re-cleaning operational systems	32
5.5	Drying methods	33
5.5.1	General	33
5.5.2	Gaseous purge-drying.....	33
5.5.3	Drying sample	34
5.5.4	Flow rates during purging.....	35
5.5.5	Vacuum drying procedure	35
5.6	Excepted components, subsystems and systems.....	36
6	Cleanliness verification requirements	37
6.1	Surface.....	37
6.1.1	Visual and UV inspection	37
6.1.2	pH-test	37
6.2	Acceptance inspection of items cleaned in a controlled environment.....	38
6.2.1	General	38
6.2.2	Test fluids	38
6.2.3	Test fluid volume for analysis	39
6.2.4	Analysis of test fluid-flush sample (solvent).....	39
6.2.5	Analysis of aqueous-based, liquid-flush sample	40
6.2.6	Drying	41
6.2.7	Vacuum drying	41
6.3	Maintaining cleanliness.....	42
6.3.1	Pressurant gas purge.....	42
6.3.2	Installation and marking of temporary hardware	42
6.3.3	Temporary hardware replacement	42

6.3.4	Component replacement.....	43
6.4	Dryness verification	43
6.4.1	General	43
6.4.2	Purge dryness.....	43
6.4.3	Vacuum dryness	43
6.4.4	Sample test and qualified procedure	44
7	Acceptance inspection of packaging materials	45
7.1	Environmental control	45
7.2	Sampling	45
7.3	Thickness of packaging film	45
7.4	Static electricity	46
7.5	Verification of cleanliness level	46
7.5.1	General	46
7.5.2	Minimum surface area for test	46
7.5.3	Sample preparation.....	46
7.5.4	Rinsing procedures	47
8	Packaging and protection	48
8.1	Approved coverings	48
8.2	Packaging operations	48
8.3	Certification labels	49
9	Deliverables	50
10	Test procedures.....	51
10.1	Test liquid-flush procedure (solvent)	51
10.2	Gas flow test procedure	51
11	Sampling and analytical practices	52
11.1	Cleanliness level test methods.....	52
11.1.1	General	52
11.1.2	Method I “Liquid Flush Test”	52
11.1.3	Method II “Liquid Flow Test”	53
11.1.4	Method III “Gas Flow Test”	53
11.1.5	Method IV “Liquid flow test under operating conditions”	53
12	Determination of particle population and NVR analysis	55
12.1	Microscopic particle population	55
12.2	Gravimetric NVR analysis method	56

Annex A (normative) Cleanliness Requirements Analysis (CRA) for spacecraft propulsion components, subsystems and systems - DRD	57
Annex B (normative) Cleaning Technique Selection (CTS) for spacecraft propulsion components, subsystems and systems - DRD	59
Annex C (normative) Cleanliness Certificate (CC) for spacecraft propulsion components, subsystems and systems - DRD	61
Annex D (normative) Typical test and cleaning liquids.....	64
Annex E (informative) Pre-cleaning sequences.....	67
Annex F (informative) Cleanliness certificate	69
Bibliography.....	71

Figures

Figure F-1 : Example of a cleanliness certificate.....	70
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Tables

Table 4-1: Cleanliness classes	24
Table 4-2: NVR contamination levels.....	25
Table 4-3: Visible contamination levels.....	27
Table 7-1: Packaging materials	46
Table E-1 : Typical pre-cleaning sequence for common materials.....	67

Foreword

This document (EN 16603-35-06:2014) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16603-35-06:2014) originates from ECSS-E-ST-35-06C 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 March 2015, and conflicting national standards shall be withdrawn at the latest by March 2015.

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 mandate 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1

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.

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 16603-35	ECSS-E-ST-35	Space engineering — Propulsion general requirements
EN 16602-40	ECSS-Q-ST-40	Space product assurance — Safety
EN 16602-70-01	ECSS-Q-ST-70-01	Space product assurance — Cleanliness and contamination control.
EN 16602-70	ECSS-Q-ST-70	Space product assurance — Materials, mechanical parts and processes
	ISO 2210:1972	Liquid halogenated hydrocarbons for industrial use—Determination of residue on evaporation
	ISO 5789:1979	Fluorinated hydrocarbons for industrial use — Determination of non-volatile residue
	ISO 5884:1978	Aerospace — Fluid systems and components — Methods for system sampling and measuring the solid particle contamination of hydraulic fluids
	ISO 14951-3:2000	Space systems — Fluid characteristics — Part 3: Nitrogen
	ISO 14951-4:2000	Space systems — Fluid characteristics — Part 4: Helium
	ISO 14951-10:2000	Space systems — Fluid characteristics — Part 10: Water
	ISO 14952-3:2003	Space systems — Surface cleanliness of fluid systems — Part 3: Analytical procedures for the determination of non-volatile residues and particulate contamination

	ASTM D257(99) 2005	Standard Test Method for DC Resistance or Conductance of Insulating Materials
	ASTM D329 10 Dec 2002	Standard specification for Acetone
	ASTM D740 15 May 2005	Standard specification for Methyl Ethyl Ketone
	ASTM D770-05 15 May 2005	Standard specification for Isopropyl Alcohol
	ASTM D1152 1 Apr 2006	Standard specification for Methanol (Methyl Alcohol)
	ASTM D1293 10 Dec 1999	Standard test methods for pH of water
	ASTM D4376	Standard specification for vapor-degreasing grade Perchloroethylene
	MIL-PRF-27415B 8 Feb 2007	Performance specification, propellant pressurizing agent, Argon
	O-E-760D 28 May 1987	Federal specification
	SEMI C47-0699 May 1999	Guideline for Trans 1,2 Dichloroethylene