

DIN EN 16603-35-02

ICS 49.140

**Raumfahrttechnik –
Feststoffantriebe für Raumfahrzeuge und Trägerraketen;
Englische Fassung EN 16603-35-02:2014**

Space engineering –
Solid propulsion for spacecrafts and launchers;
English version EN 16603-35-02:2014

Ingénierie spatiale –
Propulsion solide pour satellites et lanceurs;
Version anglaise EN 16603-35-02:2014

Gesamtumfang 39 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

Nationales Vorwort

Dieses Dokument (EN 16603-35-02:2014) wurde vom Technischen Komitee CEN/CLC/TC 5 „Raumfahrt“ erarbeitet, dessen Sekretariat vom DIN (Deutschland) gehalten wird.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-10-01 AA „Interoperabilität von Informations-, Kommunikations- und Navigationssystemen“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Dieses Dokument (EN 16603-35-02:2014) basiert auf ECSS-E-ST-35-02C.

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die englische Originalfassung von EN 16603-35-02:2014.

Dieses Dokument wurde speziell zur Behandlung von Raumfahrtsystemen erarbeitet und hat daher Vorrang vor jeglicher Europäischer Norm, da es denselben Anwendungsbereich hat, jedoch über einen größeren Geltungsbereich (z. B. Luft- und Raumfahrt) verfügt.

Nationaler Anhang NA (informativ)

Begriffe und Abkürzungen

3 Begriffe und Abkürzungen

3.1 Begriffe aus anderen Normen

Für die Anwendung dieses Dokuments gelten die Begriffe nach ECSS-S-ST-00-01, ECSS-E-ST-35, ECSS-E-ST-32 und ECSS-E-ST-32-10, insbesondere für die folgenden Benennungen:

ECSS-E-ST-32

MDP	größter Bemessungsdruck (en: maximum design pressure)
MEOP	größter erwarteter Betriebsdruck (en: maximum expected operating pressure)
	Testfaktoren KA und KQ

ECSS-E-ST-35

ea	abladierte Dicke (en: ablated thickness)
	Brenndauer (en: burning time)
ec	verkohlte Dicke (en: charred thickness)
	Korridor
	Hump-Effekt
t_{ign}	Zündzeit (en: ignition time)
ei	Dämmdicke (en: insulation thickness)
	unbeeinträchtigte Dicke(n) (en: non affected thickness(es))
	Vorwärmzeit (en: pre-heating time)
	Feststoffantrieb (en: solid rocket motor)
	Hauptschubzeit (en: thrust centroid time)

3.2 Abkürzungen

Für die Anwendung dieses Dokuments gelten die Abkürzungen nach ECSS-S-ST-00-01 und die Folgenden.

Abkürzung	Bedeutung
AIV	Montage, Integration und Prüfung (en: assembly, integration and verification)
COG	Schwerkraftzentrum (en: centre of gravity)
COM	Masseschwerpunkt (en: centre of mass)
DLAT	Abnahmeprüfung unter Werkstoffzerstörung (en: destructive lot acceptance test)
EMC	elektromagnetische Verträglichkeit (en: electromagnetic compatibility)
EMI	elektromagnetische Interferenz (en: electromagnetic interference)
ESD	elektromagnetische Entladung (en: electrostatic discharge)
GSE	Bodendienstgeräte (en: ground support equipment)
HCI	Salzsäure
MCI	Masse, Massezentrum, Trägheit (en: mass, centre of mass, inertia)
MDP	größter Bemessungsdruck (en: maximum design pressure)
MEOP	größter erwarteter Betriebsdruck (en: maximum expected operating pressure)
NDI	zerstörungsfreie Prüfung (en: non-destructive inspection)
OBDH	Datenverarbeitung an Bord (en: on-board data handling)
SRM	Feststoffantrieb (en: solid rocket motor)
TBPM	durch den Hersteller bereitzustellen (en: to be provided by manufacturer)
TBPU	durch den Nutzer bereitzustellen (en: to be provided by user)
TM/TC	Fernmessung/Fernsteuern (en: telemetry/telecommand)
TVC	Schubvektorsteuerung (en: thrust vector control)

English version

Space engineering - Solid propulsion for spacecrafts and launchers

Ingénierie spatiale - Propulsion solide pour satellites et lanceurs

Raumfahrttechnik - Feststoffantriebe für Raumfahrzeuge und Trägerraketen

This European Standard was approved by CEN on 23 February 2014.

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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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Foreword

This document (EN 16603-35-02:2014) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16603-35-02:2014) originates from ECSS-E-ST-35-02C.

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 April 2015, and conflicting national standards shall be withdrawn at the latest by April 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.

Introduction

The requirements in this Standard ECSS-E-ST-35-02C (and in the 3 other space propulsion standards ECSS-E-ST-35, ECSS-E-ST-35-01 and ECSS-E-ST-35-03) are organized with a typical structure as follows:

- functional;
- constraints;
- development;
- interfaces;
- design;
- GSE;
- materials;
- verification;
- production and manufacturing;
- in-service (operation and disposal);
- deliverables.

This standard forms parts of ECSS-E-ST-35 series which has the following structure;

- ECSS-E-ST-35 Propulsion general requirements
- ECSS-E-ST-35-01 Liquid and electric propulsion for spacecraft
- ECSS-E-ST-35-02 Solid propulsion for spacecraft and launchers
- ECSS-E-ST-35-03 Liquid propulsion for launchers
- ECSS-E-ST-35-06 Cleanliness requirements for spacecrafts propulsion hardware
- ECSS-E-ST-35-10 Compatibility testing for liquid propulsion components, subsystems, and systems

ECSS-E-ST-35 contains all the normative references, terms, definitions, abbreviated terms, symbols and DRD that are applicable for ECSS-E-ST-35, ECSS-E-ST-35-01, ECSS-E-ST-35-02 and ECSS-E-ST-35-03.

1

Scope

General requirements applying to all type of Propulsion Systems Engineering are defined in ECSS-E-ST-35. For solid propulsion activities within a space project the standards ECSS-E-ST-35 and ECSS-E-ST-35-02 are applied together.

This Standard defines the regulatory aspects that apply to the elements and processes of solid propulsion for launch vehicles and spacecraft. It specifies the activities to be performed in the engineering of these propulsion systems and their applicability. It defines the requirements for the engineering aspects such as functional, physical, environmental, quality factors, operational, and verification.

NOTE 1 Some solid propulsion systems use hot gas valves, for thrust or pressure modulation. The requirements applicable to these systems are not covered by the present document.

NOTE 2 For SRM with TVC, only moveable nozzle with flexseal are addressed.

This standard may be tailored for the specific characteristic and constrains 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 16603-20	ECSS-E-ST-20	Space engineering - Electrical and electronic
EN 16603-20-07	ECSS-E-ST-20-07	Space engineering - Electromagnetic compatibility
EN 16603-32	ECSS-E-ST-32	Space engineering - Structural general requirements
EN 16603-32-08	ECSS-E-ST-32-08	Space engineering - Materials
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 16603-35	ECSS-E-ST-35	Space engineering - Propulsion general requirements
EN 16602-20	ECSS-Q-ST-20	Space product assurance – Quality assurance
EN 16602-40	ECSS-Q-ST-40	Space product assurance - Safety
EN 16602-70	ECSS-Q-ST-70	Space product assurance - Materials, mechanical parts and processes

Terms, definition and abbreviated terms

3.1 Terms from other standards

For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01, ECSS-E-ST-35, ECSS-E-ST-32, and ECSS-E-ST-32-10 apply, in particular for the following terms:

ECSS-E-ST-32

maximum design pressure (MDP)

maximum expected operating pressure (MEOP)

test factors (KA and KQ)

ECSS-E-ST-35

ablated thickness (ea)

burning time

charred thickness (ec)

corridor

hump effect

ignition time (t_{ign})

insulation thickness (ei)

non affected thickness(es)

pre-heating time

solid rocket motor

thrust centroid time