

This document is a review generated by EVS

Space product assurance - Storage, handling and transportation of spacecraft hardware

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16602-20-08:2016 sisaldb Euroopa standardi EN 16602-20-08:2016 ingliskeelset teksti.	This Estonian standard EVS-EN 16602-20-08:2016 consists of the English text of the European standard EN 16602-20-08:2016.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 24.08.2016.	Date of Availability of the European standard is 24.08.2016.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 49.140

Standardite reproduutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:  
Aru 10, 10317 Tallinn, Eesti; koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Aru 10, 10317 Tallinn, Estonia; homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

EUROPEAN STANDARD

**EN 16602-20-08**

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2016

ICS 49.140

English version

## Space product assurance - Storage, handling and transportation of spacecraft hardware

Assurance produit des projets spatiaux - Stockage, manipulation et transport du matériel d'un véhicule spatial

Raumfahrtproduktsicherung - Lagerung, Handhabung und Transport von Raumfahrzeug-Hardware

This European Standard was approved by CEN on 22 May 2016.

CEN and CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN and CENELEC member.

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.

CEN and CENELEC members are the national standards bodies and national electrotechnical committees of 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 United Kingdom.



CEN-CENELEC Management Centre:  
Avenue Marnix 17, B-1000 Brussels

## Table of contents

<b>European Foreword.....</b>	<b>5</b>
<b>Introduction.....</b>	<b>6</b>
<b>1 Scope.....</b>	<b>7</b>
<b>2 Normative references.....</b>	<b>8</b>
<b>3 Terms, definitions and abbreviated terms.....</b>	<b>9</b>
3.1 Terms from other standards.....	9
3.2 Terms specific to the present standard .....	9
3.3 Abbreviated terms.....	10
3.4 Nomenclature .....	10
3.4.1 Formal verbs .....	10
<b>4 General requirements for storage, handling and transportation .....</b>	<b>12</b>
4.1 Project phasing.....	12
4.2 Design considerations .....	12
4.3 Nonconformance management.....	13
4.4 Safety .....	13
4.5 Environmental conditions.....	13
4.6 Packaging and protection material.....	13
4.7 Certified equipment.....	14
4.8 Training .....	14
<b>5 Storage .....</b>	<b>15</b>
5.1 General.....	15
5.2 Storage implementation.....	15
5.3 Document requirements.....	15
5.4 Configuration .....	16
5.4.1 Storage technical configuration .....	16
5.4.2 Duration .....	17
5.4.3 Environmental conditions .....	17
5.5 Storage activities .....	17
5.5.1 Pre-storage review (PSR) .....	17

5.5.2	Storage area .....	17
5.5.3	Traceability .....	18
5.5.4	Packing and unpacking activities.....	18
5.5.5	Periodic inspection and testing.....	18
5.5.6	Refurbishment and maintenance.....	18
5.5.7	Associated hardware.....	19
5.5.8	Software.....	19
5.5.9	Post storage activities .....	19
5.6	Retesting after re-assembly .....	19
5.7	Product knowledge conservation .....	19
<b>6</b>	<b>Handling .....</b>	<b>20</b>
6.1	Background .....	20
6.2	Handling MGSE requirements .....	20
6.2.1	Easy visual inspection .....	20
6.2.2	Hazardous or unsafe configuration.....	20
6.2.3	MGSE reuse .....	20
6.2.4	MGSE loose items .....	21
6.2.5	Ready for use criteria .....	21
6.2.6	MGSE logbook.....	21
6.2.7	MGSE maintenance plan .....	21
6.2.8	MGSE validation .....	22
6.3	Operational requirements .....	22
6.3.1	Dedicated procedure.....	22
6.3.2	Operation prerequisite.....	22
6.3.3	Attachment points inspection .....	23
6.3.4	Non-interruptible sequence operation .....	23
6.4	Quality requirements.....	23
6.4.1	QA witnesses .....	23
<b>7</b>	<b>Transportation .....</b>	<b>24</b>
7.1	Categories of transported goods.....	24
7.1.1	General .....	24
7.1.2	P1 products.....	24
7.1.3	P2 products.....	24
7.1.4	P3 products.....	25
7.2	Categorization of transports .....	25
7.2.1	Overview .....	25
7.2.2	Category of transports to be used .....	25

7.3	Transport general requirements.....	26
7.4	FMEA and risk analysis .....	27
7.5	Consent to transport (CTT).....	27
7.6	Escort role and responsibilities .....	28
7.6.1	Escort scope and applicability .....	28
7.6.2	Duty of the escort.....	28
7.7	Loading.....	29
7.7.1	Background.....	29
7.7.2	Requirements.....	29
7.8	Packaging requirements .....	30
7.8.1	General packaging requirements .....	30
7.8.2	Markings requirements.....	31
7.9	Transport requirements summary .....	32
<b>Annex A (normative) Storage plan (SP) DRD .....</b>	<b>33</b>	
A.1	DRD identification .....	33
A.1.1	Requirement identification and source document.....	33
A.1.2	Purpose and objective.....	33
A.2	Expected response .....	33
A.2.1	Scope and content .....	33
A.2.2	Special remarks .....	35
<b>Annex B (informative) Example of a “Movement Plan”.....</b>	<b>36</b>	
<b>Annex C (informative) Example of a "Consent to transport".....</b>	<b>38</b>	
<b>Annex D (informative) Example of a "Packing, shipping, transportation and delivery checklist" .....</b>	<b>48</b>	
<b>Annex E (informative) Deliverable per Review List .....</b>	<b>50</b>	
<b>Bibliography.....</b>	<b>51</b>	
<b>Figures</b>		
Figure B-1 : Example of Movement Plan .....	37	
Figure D-1 : Packing, shipping, transportation and delivery checklist.....	49	
<b>Tables</b>		
Table 7-1: Summary of transport requirements .....	32	
Table E-1 : Storage Plan with respected to milestones.....	50	

## European Foreword

This document (EN 16602-20-08:2016) has been prepared by Technical Committee CEN-CENELEC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-20-08:2016) originates from ECSS-Q-ST-20-08C.

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 February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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**

---

This standard focuses on requirements for preservation of space segments and associated hardware.

This document is a preview generated by EVS

**1****Scope**

The standard specifies requirements to ensure safe handling, storage, transportation of space segment hardware, including associated items to avoid degradation from integration up to launch.

The standard is applicable to: Space systems, Space segments, Assembled Spacecraft, Space segment elements, Spacecraft Modules, space segment subsystems, space segment equipment, partly manufactured space segment equipment. Intended programs are all space programs and target users all space hardware suppliers and customers.

The standard does not cover obsolescence management issues.

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

**NOTE** This standard is applicable to GSE, when mentioned in the different clauses of this standard.

## 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 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 16603-10	ECSS-E-ST-10	Space engineering - System engineering general requirements
EN 16603-10-03	ECSS-E-ST-10-03	Space engineering - Testing
EN 16601-40	ECSS-M-ST-40	Space project management- Configuration and information management
EN 16601-80	ECSS-M-ST-80	Space project management - Risk management
EN 16602-10	ECSS-Q-ST-10	Space product assurance - Product assurance management
EN 16602-10-04	ECSS-Q-ST-10-04	Space product assurance - Critical item control
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 16602-30-02	ECSS-Q-ST-30-02	Space product assurance - Failure modes effects (and criticality) analysis
EN 16602-40	ECSS-Q-ST-40	Space product assurance - Safety