SLOVENSKI STANDARD
SIST EN 16603-31-04:2019

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Vesoljska tehnika - Izmenjava podatkov termične analize

Space engineering - Exchange of thermal analysis data

Raumfahrttechnik - Austausch von Daten der Thermalanalyse

Ingénierie spatiale - Echange des données des analyses thermique

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35.240.99	Uporabniške rešitve IT na drugih področjih	IT applications in other fields
49.140	Vesoljski sistemi in operacije	Space systems and operations

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English version

Space engineering - Exchange of thermal analysis data

Ingénierie spatiale - Échange des données d'analyse thermique

Raumfahrttechnik - Austausch von thermischen Modelldaten für Raumfahrtanwendungen

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European Foreword

This document (EN 16603-31-04:2019) has been prepared by Technical Committee CEN-CENELEC/TC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16603-31-04:2019) originates from ECSS-E-ST-31-04C.

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of an identical text or by endorsement, at the latest by September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

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).

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Introduction

The space industry is a domain in which complex products are developed and operated by (usually large) international teams. Analysis and testing are essential activities within the engineering process across all disciplines and thermal control is no exception.

It is not usually possible for the many partners in the industrial teams to standardise on the same tools for thermal analysis and test or operations results data processing. Nor is it desirable to do so for a number of reasons:

- each partner should have the possibility to optimise their own processes;
- different tools may be more appropriate at different levels of the supply chain;
- healthy competition between the tool vendors promotes improvement and innovation at an affordable cost.

It is evident though, that for this philosophy to work, there is a need for easy and reliable data exchange.

An open standard that specifies an adequate neutral data format is the only viable way to realize reliable and cost effective data exchange and data sharing for the thermal analysts in the space industry. The STEP-TAS protocol provides this.

1 Scope

The requirements in this standard address the use of the STEP-TAS protocol for the exchange of thermal analysis data for space applications.

The intended audience for the requirements contained in this document is the developers of space thermal analysis software. The overview of STEP-TAS provided in clause 4 can also be of more interest general to a wider audience.

The requirements contained within this standard do not address the end users of the space thermal analysis tools – namely thermal engineers and thermal analysts. The rationale for this decision is that the primary applicable document for space thermal engineers (working on European projects) is the thermal control standard ECSS-E-ST-31. As such the best location for requirements addressing thermal engineers and analysts is the top level standard ECSS-E-ST-31.

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

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 16003-31	ECSS-E-ST-31	Space engineering - Thermal control general requirements
EN 16003-40	ECSS-E-ST-40	Space engineering - Software
	ISO 10303-11 (2004)	Industrial automation systems and integration – Product data representation and exchange – Part 11: The EXPRESS language reference manual (second edition, 2004)
	ISO 10303-21 (2002)	Industrial automation systems and integration – Product data representation and exchange – Part 21: Implementation methods: Clear text encoding of the exchange structure (second edition, 2002)

3
Terms, definitions and abbreviated terms

3.1 Terms from other standards

a. For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 apply.

b. For the purpose of this Standard, the terms and definitions from ECSS-E-ST-31 apply, in particular for the following terms:

1. geometrical mathematical model
2. thermal mathematical model

c. For the purpose of this Standard, the terms and definitions from ECSS-E-ST-40 apply, in particular for the following terms:

1. software component

3.2 Terms specific to the present standard

3.2.1 data exchange

process of transforming an **exchange structure** represented in a **source format** into equivalent data expressed in a different **target format**.

NOTE 1 to entry This can be a multi-stage process transforming from source format to a working data structure in memory and then to the target format.

3.2.2 dataset

<CONTEXT: STEP-TAS>

coherent and **valid population** conforming to the STEP-TAS schema (Annex A)

3.2.3 exchange structure

computer-interpretable format used for storing, accessing, transferring, and archiving data.

NOTE 1 to entry This term is adopted from [ISO 10303]

3.2.4 interface

<CONTEXT: STEP-TAS>

reader or **writer**

3.2.5 population

set of STEP-TAS entities

NOTE 1 to entry A STEP-TAS dataset is an example of a population.

3.2.6 reader

<CONTEXT: STEP-TAS>

software component which takes a **STEP-TAS dataset** as input, implements a **data exchange** process and generates a **target format**.

3.2.7 source format

input to a **data exchange** process

NOTE 1 to entry The data can be in a file on disk or in memory

3.2.8 target format

output of a **data exchange** process

3.2.9 valid population

a **population** that has been successfully passed a **validation**

3.2.10 validation

process of checking that all algorithmic constraints are satisfied

NOTE 1 to entry In the terminology of [ISO 10303] and STEP-TAS these algorithmic constraints are called “WHERE rules”.

3.2.11 writer

<CONTEXT: STEP-TAS>

software component which takes a **source format** as input, implements a **data exchange** process and generates a **STEP-TAS dataset**.

3.3 Abbreviated terms

The following abbreviations are defined and used within this standard:

Abbreviation	Meaning
AP	application protocol
API	application programming interface
CAD	computer aided design
CC	conformance class
CPU	central processing unit
GMM	geometrical mathematical model
ISO	International Organization for Standardization
MGM	meshed geometric model

Abbreviation	Meaning
NRF	network-model and results format
SDK	software development kit
SKM	space kinematic model
SMA	space mission aspects
STEP	standard for the exchange of product data
TAS	thermal analysis for space
TMM	thermal mathematical model
UML	unified modelling language

3.4 Nomenclature

The following nomenclature applies throughout this document:

a. The word “shall” is used in this Standard to express requirements. All the requirements are expressed with the word “shall”.

b. The word “should” is used in this Standard to express recommendations. All the recommendations are expressed with the word “should”.

NOTE It is expected that, during tailoring, recommendations in this document are either converted into requirements or tailored out.

c. The words “may” and “need not” are used in this Standard to express positive and negative permissions, respectively. All the positive permissions are expressed with the word “may”. All the negative permissions are expressed with the words “need not”.

d. The word “can” is used in this Standard to express capabilities or possibilities, and therefore, if not accompanied by one of the previous words, it implies descriptive text.

NOTE In ECSS “may” and “can” have completely different meanings: “may” is normative (permission), and “can” is descriptive.

e. The present and past tenses are used in this Standard to express statements of fact, and therefore they imply descriptive text.