



# SLOVENSKI STANDARD

## SIST EN 16602-70-04:2015

01-januar-2015

Nadomešča:  
SIST EN 14098:2004

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**Zagotavljanje varnih proizvodov v vesoljski tehniki - Toplotno preskušanje za ocenjevanje vesoljskih materialov, procesov, mehanskih delov in sestavov**

Space product assurance - Thermal testing for the evaluation of space materials, processes, mechanical parts and assemblies

Raumfahrtproduktsicherung - Temperaturtest zur Untersuchung von Werkstoffen, Prozessen, mechanischen Teilen und Zusammenbauten der Raumfahrttechnik

Assurance produit des projets spatiaux - Essais thermiques pour l'évaluation des matériaux, des processus, des composants et assemblages mécaniques d'un projet spatial

**Ta slovenski standard je istoveten z: EN 16602-70-04:2014**

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**ICS:**

49.140 Vesoljski sistemi in operacije Space systems and operations

**SIST EN 16602-70-04:2015**

**en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 16602-70-04**

October 2014

ICS 49.140

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English version

## Space product assurance - Thermal testing for the evaluation of space materials, processes, mechanical parts and assemblies

Assurance produit des projets spatiaux - Essais thermiques pour l'évaluation des matériaux, des processus, des composants et assemblages mécaniques d'un projet spatial

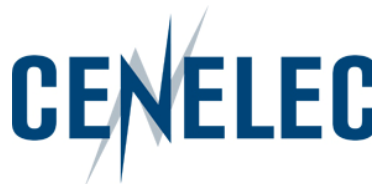
Raumfahrtproduktsicherung - Temperaturtest zur Untersuchung von Werkstoffen, Prozessen, mechanischen Teilen und Zusammenbauten der Raumfahrttechnik

This European Standard was approved by CEN on 20 March 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

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This document (EN 16602-70-04:2014) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-70-04:2014) originates from ECSS-Q-ST-70-04C.

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 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 supersedes EN 14098:2001.

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

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The deleterious effects to be anticipated during the thermal cycling test under vacuum include:

- outgassing,
- cracking or fracture of materials or assemblies due to sudden dimensional changes by expansion,
- contraction or pressure,
- short circuiting of electrical wiring,
- overheating of materials or assemblies due to change in convection and conductive heat transfer characteristics.

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# 1 Scope

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This Standard establishes the requirements for the specification, the procedures, the execution and the reporting of a thermal cycling test under vacuum for the evaluation of materials, processes, mechanical parts and assemblies intended for use in the fabrication of spacecraft and associated equipment. This is one of the tests to determine the ability of these articles to withstand changes of ambient temperature under vacuum.

Typical materials or assemblies that can be evaluated by means of this test method are listed below.

- adhesives;
- adhesive bonded joints;
- coatings (paint, thermal and protective);
- insulating materials;
- metallic bonded joints;
- metallic samples, finished by plating or chemical conversion;
- metallized plastic films;
- organic or non-organic bonding;
- plated surfaces;
- potting compounds;
- reinforced structural laminates;
- sealants.

NOTE This is not an exhaustive list and other products or items can be tested.

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

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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 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 16602-20-07	ECSS-Q-ST-20-07	Space product assurance – Quality assurance for test centres
EN 16602-70	ECSS-Q-ST-70	Space product assurance – Materials, mechanical parts and processes

## Terms, definitions and abbreviated terms

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### 3.1 Terms from other standards

For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 and ECSS-Q-ST-70 apply.

### 3.2 Terms specific to the present standard

#### 3.2.1 batch

see "lot"

#### 3.2.2 lot

quantity produced at one operation

NOTE 1 One lot can be divided in several sub-lots.

NOTE 2 The term "batch" is synonymous.

### 3.3 Abbreviated terms

For the purpose of this Standard, the abbreviated terms from ECSS-S-ST-00-01 and the following apply:

Abbreviation	Meaning
QCM	quartz crystal microbalance
UV	ultraviolet

# 4 Principles

The principles of the thermal test for the evaluation of space materials and processes is to submit the item to be tested (materials, processes, mechanical parts or assemblies) to a certain number of thermal cycles, oscillating within an defined temperature range in order to anticipate and to evaluate the resistance to deleterious effects as:

- outgassing,
- cracking or fracture of materials or assemblies due to sudden dimensional changes by expansion,
- contraction or pressure,
- short circuiting of electrical wiring,
- overheating of materials or assemblies due to change in convection and conductive heat transfer characteristics.

For this purpose the activities related to thermal cycling tests requirements, specifications, procedures and reports are described in Figure 4-1 and the related requirements are captured in clause 5.

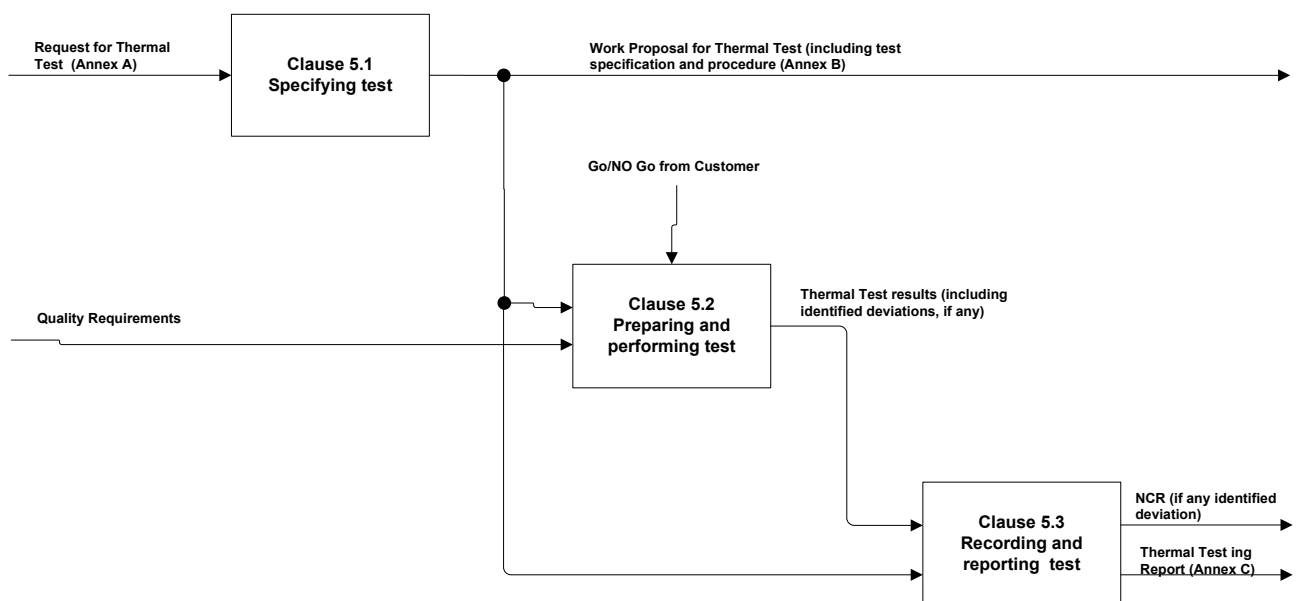


Figure 4-1: Thermal cycling test process overview