



SLOVENSKI STANDARD

SIST EN 14098:2004

01-maj-2004

Space product assurance - Thermal cycling test for the screening of space materials and processes

Space product assurance - Thermal cycling test for the screening of space materials and processes

Raumfahrtproduktsicherung - Temperaturwechseltest zur Untersuchung von Werkstoffen und Verfahren der Raumfahrttechnik

Assurance produit des projets spatiaux - Essai de cyclage thermique pour la sélection des matériaux et des processus d'un projet spatial

[https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-](https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004)

[ad57-6560507b819a/sist-en-14098-2004](https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004)

Ta slovenski standard je istoveten z: EN 14098:2001

ICS:

49.140 Vesoljski sistemi in operacije Space systems and operations

SIST EN 14098:2004

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 14098:2004

<https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14098

October 2001

ICS 49.140

English version

**Space product assurance - Thermal cycling test for the
screening of space materials and processes**

This European Standard was approved by CEN on 28 September 2001.

CEN 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 Management Centre or to any CEN 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 member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 14098:2004

<https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004>



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

	page
Foreword	4
Introduction	4
1 Scope.....	5
2 Normative references	5
3 Terms, definitions and abbreviated terms	6
3.1 Terms and definitions	6
3.2 Abbreviated terms	6
4 Preparatory conditions.....	6
4.1 Hazards, health and safety precautions	6
4.2 Preparation of samples	6
4.2.1 Configuration	6
4.2.2 Cleaning	6
4.2.3 Handling and storage	7
4.2.4 Identification	7
4.3 Facilities	7
4.3.1 Cleanliness	7
4.3.2 Environment conditions	7
4.4 Equipment.....	7
4.4.1 Test equipment.....	7
4.4.2 Special apparatus	8
5 Test procedure	8
5.1 General	8
5.2 Pre and post test.....	8
5.3 Thermal cycling test.....	8
5.4 Handling and packing of tested samples.....	9
6 Acceptance criteria.....	9
7 Quality assurance	10

7.1	General	10
7.2	Data	10
7.3	Nonconformance	10
7.4	Calibration	10
7.5	Traceability	11

Figures

Figure 1 — Test procedure flow diagram	9
--	---

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 14098:2004](https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004)

<https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004>

EN 14098:2001 (E)**Foreword**

This European Standard has been prepared by CMC.

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 2002, and conflicting national standards shall be withdrawn at the latest by April 2002.

It is based on a previous version¹⁾ prepared by the ECSS Product Assurance Standards Working Group, reviewed by the ECSS Technical Panel and approved by the ECSS Steering Board. The European Cooperation for Space Standardization (ECSS) is a cooperative effort of the European Space Agency, National Space Agencies and European industry associations for the purpose of developing and maintaining common standards.

This Standard is one of the series of space standards intended to be applied together for the management, engineering and product assurance in space projects and applications.

Requirements in this Standard are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

The formulation of this Standard takes into account the existing ISO 9000 family of documents.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The deleterious effects to be anticipated during the thermal cycling test under vacuum include: outgassing (testing for this is detailed in ECSS-Q-70-02), cracking or fracture of materials or assemblies due to sudden dimensional changes by expansion, contraction or pressure, short circuiting of electrical wiring and overheating of materials or assemblies due to change in convection and conductive heat transfer characteristics.

¹⁾ ECSS-Q-70-04A.

1 Scope

This European Standard details a thermal cycling test under vacuum for the screening of materials and processes intended for use in the fabrication of spacecraft and associated equipment. The test determines the ability of these or other 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. This is not an exhaustive list and other products or items can be tested:

- 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;
- pressure-sensitive tapes;
- printed circuit boards;
- reinforced structural laminates;
- sealants;
- soldered or welded joints.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 14098:2004](https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004)

<https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004>

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13701, *Space systems - Glossary of terms*.

ECSS-Q-20A, *Space product assurance — Quality assurance*.

EN 14097, —²⁾, *Space product assurance — Nonconformance control system*.

ISO 14620-1, —²⁾, *Space systems - Safety requirements - Part 1: System safety*.

²⁾ To be published.

EN 14098:2001 (E)

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13701, EN 13291-3 and the following term and definition apply.

3.1.1

batch

quantity produced at one operation

NOTE One batch can be subdivided into several lots.

3.2 Abbreviated terms

The following abbreviated term is defined and used within this European Standard.

Abbreviation	Meaning
RH	relative humidity

4 Preparatory conditions

4.1 Hazards, health and safety precautions

Materials and parts with hazardous characteristics shall be identified, managed and processed according to ISO 14620-1. Particular attention shall be given to health and safety precautions. In particular, hazards to personnel, equipment and materials shall be controlled and minimized.

4.2 Preparation of samples

[SIST EN 14098:2004](https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004)

4.2.1 Configuration

<https://standards.iteh.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004>

- a) The material samples shall be prepared according to the relevant process specifications or manufacturer's data and shall be representative of batch variance.
- b) If it is not practicable to test completed assemblies, the manufacturer shall submit samples made from the same materials and by the same processes as those used in the manufacture of the assemblies.
- c) The test sample shall be prepared from the material or assembly samples as follows:
 - The sample for testing shall have one flat surface which does not overlap the dimensions of the sample holder to be used in the test.
 - The flat surface shall be in continuous contact with the sample holder, attached by any form of clamping arrangement which does not cover more than 10 % of the sample's remaining surfaces.
 - The maximum thickness of the sample shall be such that, under vacuum of 10^{-5} Pa, any point of extremity shall not differ by more than 5 °C from the temperature of the sample holder. This parameter depends on the thermal conductivity properties of the sample.

4.2.2 Cleaning

The cleaning and other treatments of the sample shall be the same as that applied to the finished article, which the sample is intended to represent, prior to integration into the spacecraft. Further cleaning or other treatments are not permitted.

4.2.3 Handling and storage

Samples shall only be handled with clean nylon or lint-free gloves and shall be stored in a controlled area, with an ambient temperature of $(22 \pm 3) ^\circ\text{C}$ and relative humidity of $(55 \pm 10) \%$. Coated surfaces shall be shielded from contact by using polyethylene or polypropylene bags or sheets. Physical damage shall be avoided by packing the polyethylene or polypropylene-wrapped workpieces in clean, dust- and lint-free material. Limited-life materials shall be labelled with their shelf lives and dates of manufacture, or date of delivery if date of manufacture is not known.

4.2.4 Identification

4.2.4.1 Materials

Materials submitted for testing shall be clearly identified with appropriate details to maintain traceability.

4.2.4.2 Assemblies

Assemblies submitted for testing shall be identified, as a minimum, by:

- a) trade name and batch number;
- b) name of manufacturer or supplier through whom the purchase was made;
- c) configuration control status of the assembly.

4.3 Facilities

4.3.1 Cleanliness

The work area shall be nominally clean with minimum dust, but not necessarily a cleanroom environment. Air used for ventilation shall be nominally filtered to prevent contamination of the sample.

[SIST EN 14098:2004](https://standards.itech.ai/catalog/standards/sist/4bb3b665-3454-4d56-ad57-6560507b819a/sist-en-14098-2004)

4.3.2 Environment conditions

The ambient conditions for the process and work areas shall be $(22 \pm 3) ^\circ\text{C}$ with a relative humidity of $(55 \pm 10) \%$ unless otherwise stated.

4.4 Equipment

4.4.1 Test equipment

The following test equipment shall be used. Additional test equipment may be used if further tests are invoked by the project.

a) Microscope

At least $\times 20$ magnification with attachment to enable photomicrographs to be taken.

b) Electrical instruments (if applicable)

To monitor any electrical degradation of the sample, i.e. insulation, current and other parameters as appropriate.