



# SLOVENSKI STANDARD

## SIST EN 16602-70-09:2015

01-april-2015

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### Zagotavljanje varnih proizvodov v vesoljski tehniki - Merjenje termooptičnih lastnosti materialov za termalno kontrolo

Space product assurance - Measurements of thermo-optical properties of thermal control materials

Raumfahrtproduktsicherung - Messung der thermo-optischen Eigenschaften von Materialien zur Thermalkontrolle

Assurance produit des projets spatiaux - Mesures des propriétés thermo-optiques des matériaux de contrôle thermique

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#### **ICS:**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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## Space product assurance - Measurements of thermo-optical properties of thermal control materials

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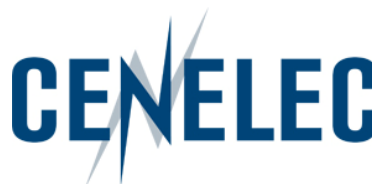
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## Foreword

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This document (EN 16602-70-09:2015) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-70-09:2015) originates from ECSS-Q-ST-70-09C.

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of an identical text or by endorsement, at the latest by July 2015, and conflicting national standards shall be withdrawn at the latest by July 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of 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

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The thermo-optical properties of materials are of importance to enable the calculation of the thermal housekeeping and radiative heat transfer.

This Standard describes the methodology, instruments, equipment and samples, used to calculate the thermo-optical properties of thermal-control materials, i.e. solar absorptance [ $\alpha_s$  or  $\alpha_p$ ] and the infrared emittance [ $\varepsilon_i$  or  $\varepsilon_n$ ].

In general this procedure has been written in connection with instruments and equipment available at ONERA, INTESPACE and ESTEC; however, any supplier is encouraged to built up his own instrument or equipment provided the accuracy of the results is equivalent to the one specified herein.

In this Standard, the supplier is identified as the entity that performs the test.

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# 1

## Scope

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This Standard describes the methodology, instruments, equipment and samples, used to calculate the thermo-optical properties of thermal-control materials.

The following test methods are detailed in this Standard including the configuration of samples and calculations:

- Solar absorptance using spectrometer ( $\alpha_s$ ) - (see Annex C.2).
- Comparative test method ( $\alpha_p$ ) - (see Annex C.3).
- Infrared emittance using thermal test method ( $\epsilon_h$ ) - (see Annex C.4).
- Infrared emittance using IR spectrometer ( $\epsilon_n$ ) - (see annex C.5).
- Infrared emittance using portable equipment ( $\epsilon_n$ ) - (see Annex C.6).

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

## 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	ECSS-Q-ST-10	Space product assurance – Product assurance management
EN 16602-10-09	ECSS-Q-ST-10-09	Space product assurance – Nonconformance control system
EN 16602-20-07	ECSS-Q-ST-20-07	Space product assurance – Quality assurance for test centres
EN 16602-70-02	ECSS-Q-ST-70-02	Space product assurance – Thermal vacuum outgassing test for the screening of space materials

## Terms, definitions and abbreviated terms

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### 3.1 Terms defined in other standards

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

### 3.2 Terms specific to the present standard

#### 3.2.1 absorptance

ratio of the intensity of the incident light to the transmitted or reflected light

#### 3.2.2 emittance ( $\epsilon$ )

ratio of the radiant intensity of the specimen to that emitted by a black body radiator at the same temperature and under the same geometric and wavelength conditions

NOTE For example:  
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- Hemispherical emittance ( $\epsilon_h$ ) - conditions for incident or viewing of flux over a hemispherical region.
- Normal emittance ( $\epsilon_n$ ) - conditions for incidence or viewing through a solid angle normal to the specimen.

#### 3.2.3 solar absorptance ( $\alpha$ ) $\square$

ratio of the solar radiant flux absorbed by a material (or body) to that incident upon it

NOTE Differentiation is made between two methods:

- Spectroscopic method using a photospectrometer covering the range from 0,25  $\mu\text{m}$  up to 2,5  $\mu\text{m}$  for the determination of  $\alpha_s$ .
- Portable equipment using a xenon flash for relative measurements ( $\alpha_p$ ).

### 3.3 Abbreviated terms

The abbreviated terms defined in ECSS-S-ST-00-01 apply.