SLOVENSKI STANDARD

SIST-TP CEN/CLC/TR 17603-31-03:2021

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Vesoljska tehnika - Priročnik o toplotni zasnovi - 3. del: Površinska temperatura vesoljskih plovil

Space Engineering - Thermal design handbook - Part 3: Spacecraft Surface Temperature

Raumfahrttechnik - Handbuch für thermisches Design - Teil 3: Oberflächentemperatur von Raumfahrzeugen

Ingénierie spatiale - Manuel de conception thermique - Partie 3: Température de surface des véhicules spatiaux

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Raumfahrttechnik - Handbuch für thermisches Design - Teil 3: von Oberflächen auf Raumfahrzeugen

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European Foreword

This document (CEN/CLC/TR 17603-31-03:2021) has been prepared by Technical Committee CEN/CLC/JTC 5 "Space", the secretariat of which is held by DIN.

It is highlighted that this technical report does not contain any requirement but only collection of data or descriptions and guidelines about how to organize and perform the work in support of EN 16603-31.

This Technical report (TR 17603-31-03:2021) originates from ECSS-E-HB-31-01 Part 3A.

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 TR covering the same scope but with a wider domain of applicability (e.g.: aerospace).

1 Scope

Factors affecting the equilibrium temperature of a spacecraft surface are described in this Part 3 using simple geometrical configurations and basic assumptions.

Methods for conducting calculations on the affect of Solar, planetary and albedo radiation are given taking into consideration the internal and immediate environmental factors and incorporating the various configurations and dimensions of the constituent parts.

The Thermal design handbook is published in 16 Parts

TR 17603-31-01	Thermal design handbook – Part 1: View factors
TR 17603-31-02	Thermal design handbook – Part 2: Holes, Grooves and Cavities
TR 17603-31-03	Thermal design handbook – Part 3: Spacecraft Surface Temperature
TR 17603-31-04	Thermal design handbook – Part 4: Conductive Heat Transfer
TR 17603-31-05	Thermal design handbook – Part 5: Structural Materials: Metallic and Composite
TR 17603-31-06	Thermal design handbook – Part 6: Thermal Control Surfaces
TR 17603-31-07	Thermal design handbook – Part 7: Insulations
TR 17603-31-08	Thermal design handbook – Part 8: Heat Pipes
TR 17603-31-09	Thermal design handbook – Part 9: Radiators
TR 17603-31-10	Thermal design handbook – Part 10: Phase – Change Capacitors
TR 17603-31-11	Thermal design handbook – Part 11: Electrical Heating
TR 17603-31-12	Thermal design handbook – Part 12: Louvers
TR 17603-31-13	Thermal design handbook – Part 13: Fluid Loops
TR 17603-31-14	Thermal design handbook – Part 14: Cryogenic Cooling
TR 17603-31-15	Thermal design handbook – Part 15: Existing Satellites
TR 17603-31-16	Thermal design handbook – Part 16: Thermal Protection System

2
References

EN Reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS System - Glossary of terms

All other references made to publications in this Part are listed, alphabetically, in the **Bibliography**.

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.2 Symbols

A_E	emitting area of the spacecraft, [m²]
A_I	area of the spacecraft projected from the sun, [m²]
B_i	parameters of the truncated power series development of F_{SP}, see clause 6.1
F	Albedo view factor from spacecraft to planet
F_{SP}	view factor from spacecraft to planet
R_P	mean radius of the planet, [m]
S	solar flux, [W.m^{-4}] $S = S_0.d^{-2}$
S_0	solar constant, $S_0 = 1353$ W.m^{-2}
T	temperature, [K]
T_A	Albedo temperature, [K] $T_A = [aS_0/\sigma d^2]^{1/4}$
T_R	radiation equilibrium temperature of the infinitely conductive spacecraft, [K]
T_{RA}	radiation equilibrium temperature of the infinitely conductive spacecraft under Albedo radiation, [K]
T_{RP}	radiation equilibrium temperature of the infinitely conductive spacecraft under planetary radiation, [K]
T_P	equivalent planet temperature, [K] $T_P = (e/\sigma)^{1/4}$
T_s	equivalent surrounding temperature, [K]
a	mean Albedo of the planet