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Space Engineering - Thermal design handbook - Part 16: Thermal Protection System

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English version

Space Engineering - Thermal design handbook - Part 16: Thermal Protection System

Ingénierie spatiale - Manuel de conception thermique - Partie 16 : Protection Thermique des véhicules spatiaux

Raumfahrttechnik - Handbuch für thermisches Design - Teil 16: Thermalschutzsysteme

This Technical Report was approved by CEN on 28 June 2021. It has been drawn up by the Technical Committee CEN/CLC/JTC 5.

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Table of contents

Figures

European Foreword

This document (CEN/CLC/TR 17603-31-16:2021) 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 17603-31-16:2021) originates from ECSS-E-HB-31-01 Part 16A.

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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

The thermal protection system (TPS) of a space vehicle ensures the structural integrity of the surface of the craft and maintains the correct internal temperatures (for crew, electronic equipment, etc.) when the vehicle is under the severe thermal loads of re-entry. These loads are characterised by very large heat fluxes over the relatively short period of re-entry.

The design of thermal protection systems for re-entry vehicles is very complex due to the number and complexity of phenomena involved: the flow around the vehicle is hypersonic, tridimensional and reactive, and its interaction with the vehicle's surface may induce chemical reactions which are not fully understood.

Two TPS concepts for re-entry vehicles, ablative and radiative are examined and there is also an anlyisis of existing systems using them.

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 16603-00-01	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**.