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# Space engineering - Thermal design handbook - Part 10: Phase - Change Capacitor

Ingénierie spatiale - Manuel de conception thermique - Partie 10 : Réservoirs de matériaux à changement de phase

Raumfahrttechnik - Handbuch für thermisches Design - Teil 10: Kondensatoren mit Phasenübergängen

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# European Foreword

This document (CEN/CLC/TR 17603-31-10:2021) 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 17603-31-10:2021) originates from ECSS-E-HB-31-01 Part 10A.

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).

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# 1 Scope

Solid-liquid phase-change materials (PCM) are a favoured approach to spacecraft passive thermal control for incident orbital heat fluxes or when there are wide fluctuations in onboard equipment.

The PCM thermal control system consists of a container which is filled with a substance capable of undergoing a phase-change. When there is an the increase in surface temperature of spacecraft the PCM absorbs the excess heat by melting. If there is a temperature decrease, then the PCM can provide heat by solidifying.

Many types of PCM systems are used in spacecrafts for different types of thermal transfer control.

Characteristics and performance of phase control materials are described in this Part. Existing PCM systems are also described.

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 |
| TR 17603-30-06 | ECSS-E-HB-31-01 Part 6 | Thermal design handbook – Part 6: Thermal Control Surfaces |
| TR 17603-30-11 | ECSS-E-HB-31-01 Part 11 | Thermal design handbook – Part 11: Electrical Heating |

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

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