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Recommended Values of the Thermophysical Properties of Eight Alloys, Their Major Constituents and Oxides

Technical personnel who design, fabricate, and manufacture products, components, processes, and systems which involve extreme temperature environments such as cryogenic and high temperatures to and beyond the melting range require the knowledge of the thermophysical properties of the basic alloys, their constituents and oxides that would be utilized. A single reference work has been prepared that provides in tabular and graphical form the recommended properties of specific heat, thermal conductivity, viscosity, thermal emissivity, thermal diffusivity, density, and surface tension of aluminum, aluminum alloys, inconel, titanium, beryllium and stainless steel.

The data are contained in the technical report: "Recommended Values of the Thermophysical Properties of Eight Alloys, Major Constituents and their Oxides," edited by Y.S. Touloukian, Thermophysical Properties Research Center, Purdue University, Lafayette, Indiana, February 1966.

The table shown represents the materials studied and the properties for which data were available. It should be noted that serious gaps of information exist in the literature for several of the properties for most

of the materials studied. An effort was made to fill in these gaps wherever feasible through theoretical or semiempirical considerations. Some of the data were also extrapolated whenever it was believed justifiable within the limits of tolerances set for most engineering applications.

Note:

Copies of the report are available from:
Technology Utilization Officer
AEC-NASA Space Nuclear Propulsion
Office
U.S. Atomic Energy Commission
Washington, D.C. 20545
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No patent action is contemplated by AEC or NASA.

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PROPERTIES OF THE ALLOYS, THEIR MAJOR CONSTITUENTS, AND OXIDES THAT ARE INCLUDED IN THE REFERENCED TEXT

MATERIALS	Thermal Conductivity	Viscosity	Thermal Emissivity	Thermal Diffusivity	Specific Heat	Density	Surface Tension
ELEMENTS:							
Aluminum
Beryllium
Chromium
Copper
Iron
Magnesium
Manganese
Nickel
Niobium
Silicon
Tin
Titanium
Zinc
ALLOYS:							
Aluminum Alloy 2219—T852
Aluminum Alloy 6061—T6
Aluminum Alloy 7075—T6
Beryllium Alloy (dilute alloy)
Inconel X-750
Stainless Steel 304
Stainless Steel 347
Titanium Alloy A-110AT
OXIDES:							
Aluminum Oxide Al ₂ O ₃
Beryllium Oxide BeO
Chromium Oxide Cr ₂ O ₃
Cupric Oxide CuO
Cuprous Oxide Cu ₂ O
Ferrous Oxide FeO
Ferric Oxide Fe ₂ O ₃
Iron Oxide Fe ₃ O ₄
Magnesium Oxide MgO
Manganese Monoxide MnO
Manganese Dioxide MnO ₂
Manganese Sesquioxide Mn ₂ O ₃
Manganomanganic Oxide Mn ₃ O ₄
Nickel Oxide NiO
Niobium Monoxide NbO
Niobium Dioxide NbO ₂
Niobium Pentoxide Nb ₂ O ₅
Silicon Dioxide SiO ₂
Tin(ous) Oxide SnO
Tin(ic) Oxide SnO ₂
Titanium Monoxide TiO
Titanium Dioxide TiO ₂
Titanium Sesquioxide Ti ₂ O ₃
Titanium Tripentoxide Ti ₃ O ₅
Zinc Oxide ZnO