AEC-NASA TECH BRIEF

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
Reference: B67-10062

Patent status:

No patent action is contemplated by AEC or NASA.

Source: Y. S. Touloukian
of Purdue University
under contract to
AEC-NASA Space Nuclear Propulsion Office
(NU-0095)

(continued overleaf)

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_2O_3	•	•	•	•	•	•	•
Beryllium Oxide BeO	•		•	•	•	•	
Chromium Oxide Cr_2O_3			•		•	•	•
Cupric Oxide CuO			•		•		
Cuprous Oxide Cu_2O			•		•		
Ferrous Oxide FeO		•	•		•	•	•
Ferric Oxide Fe_2O_3	•		•	•	•	•	
Iron Oxide Fe_3O_4	•			•	•		
Magnesium Oxide MgO	•		•	•	•	•	•
Manganese Monoxide MnO	•			•	•	•	
Manganese Dioxide MnO_3					•		
Manganese Sesquioxide Mn_2O_3					•		
Manganomanganic Oxide Mn_3O_4	•			•	•		
Nickel Oxide NiO	•		•	•	•	•	
Niobium Monoxide NbO					•		
Niobium Dioxide NbO_2					•		
Niobium Pentoxide Nb_2O_5			•		•	•	
Silicon Dioxide SiO_2	•	•	•	•	•	•	•
Tin(ous) Oxide SnO					•		
Tin(ic) Oxide SnO_2	•			•	•	•	
Titanium Monoxide TiO					•		
Titanium Dioxide TiO_2	•		•	•	•	•	
Titanium Sesquioxide Ti_2O_3					•		
Titanium Tripentoxide Ti_3O_5					•		
Zinc Oxide ZnO	•		•	•	•		