

Table B.8 Room-Temperature Specific Heat Values for Various Engineering Materials

<i>Material</i>	<i>Specific Heat</i>	
	<i>J/kg-K</i>	<i>10⁻²Btu/lb_m-°F</i>
METALS AND METAL ALLOYS		
Plain Carbon and Low Alloy Steels		
Steel alloy A36	486 ^a	11.6 ^a
Steel alloy 1020	486 ^a	11.6 ^a
Steel alloy 1040	486 ^a	11.6 ^a
Stainless Steels		
Stainless alloy 304	500	12.0
Stainless alloy 316	500	12.0
Stainless alloy 405	460	11.0
Stainless alloy 440A	460	11.0
Stainless alloy 17-7PH	460	11.0
Cast Irons		
Gray irons		
• Grade G1800	544	13
• Grade G3000	544	13
• Grade G4000	544	13
Ductile irons		
• Grade 60-40-18	544	13
• Grade 80-55-06	544	13
• Grade 120-90-02	544	13
Aluminum Alloys		
Alloy 1100	904	21.6
Alloy 2024	875	20.9
Alloy 6061	896	21.4
Alloy 7075	960 ^b	23.0 ^b
Alloy 356.0	963 ^b	23.0 ^b
Copper Alloys		
C11000 (electrolytic tough pitch)	385	9.2
C17200 (beryllium-copper)	420	10.0
C26000 (cartridge brass)	375	9.0
C36000 (free-cutting brass)	380	9.1
C71500 (copper-nickel, 30%)	380	9.1
C93200 (bearing bronze)	376	9.0
Magnesium Alloys		
Alloy AZ31B	1024	24.5
Alloy AZ91D	1050	25.1
Titanium Alloys		
Commercially pure (ASTM grade 1)	528 ^c	12.6 ^c
Alloy Ti-5Al-2.5Sn	470 ^c	11.2 ^c
Alloy Ti-6Al-4V	610 ^c	14.6 ^c
Precious Metals		
Gold (commercially pure)	130	3.1
Platinum (commercially pure)	132 ^d	3.2 ^d
Silver (commercially pure)	235	5.6

Table B.8 (Continued)

<i>Material</i>	<i>Specific Heat</i>	
	<i>J/kg-K</i>	<i>10⁻²Btu/lb_m-°F</i>
Refractory Metals		
Molybdenum (commercially pure)	276	6.6
Tantalum (commercially pure)	139	3.3
Tungsten (commercially pure)	138	3.3
Miscellaneous Nonferrous Alloys		
Nickel 200	456	10.9
Inconel 625	410	9.8
Monel 400	427	10.2
Haynes alloy 25	377	9.0
Invar	500	12.0
Super invar	500	12.0
Kovar	460	11.0
Chemical lead	129	3.1
Antimonial lead (6%)	135	3.2
Tin (commercially pure)	222	5.3
Lead-Tin solder (60Sn-40Pb)	150	3.6
Zinc (commercially pure)	395	9.4
Zirconium, reactor grade 702	285	6.8
GRAPHITE, CERAMICS, AND SEMICONDUCTING MATERIALS		
Aluminum oxide		
• 99.9% pure	775	18.5
• 96%	775	18.5
• 90%	775	18.5
Concrete	850-1150	20.3-27.5
Diamond (natural)	520	12.4
Gallium arsenide	350	8.4
Glass, borosilicate (Pyrex)	850	20.3
Glass, soda-lime	840	20.0
Glass ceramic (Pyroceram)	975	23.3
Graphite		
• Extruded	830	19.8
• Isostatically molded	830	19.8
Silica, fused	740	17.7
Silicon	700	16.7
Silicon carbide		
• Hot pressed	670	16.0
• Sintered	590	14.1
Silicon nitride		
• Hot pressed	750	17.9
• Reaction bonded	870	20.7
• Sintered	1100	26.3
Zirconia, 3 mol% Y ₂ O ₃	481	11.5
POLYMERS		
Epoxy	1050	25
Nylon 6,6	1670	40
Phenolic	1590-1760	38-42
Polybutylene terephthalate (PBT)	1170-2300	28-55
Polycarbonate (PC)	840	20

Table B.8 (Continued)

Material	Specific Heat	
	J/kg·K	10⁻²Btu/lb_m·°F
Polyester (thermoset)	710–920	17–22
Polyethylene		
• Low density (LDPE)	2300	55
• High density (HDPE)	1850	44.2
Polyethylene terephthalate (PET)	1170	28
Polymethyl methacrylate (PMMA)	1460	35
Polypropylene (PP)	1925	46
Polystyrene (PS)	1170	28
Polytetrafluoroethylene (PTFE)	1050	25
Polyvinyl chloride (PVC)	1050–1460	25–35
FIBER MATERIALS		
Aramid (Kevlar 49)	1300	31
E Glass	810	19.3
COMPOSITE MATERIALS		
Wood		
• Douglas fir (12% moisture)	2900	69.3
• Red oak (12% moisture)	2900	69.3

^a At temperatures between 50°C and 100°C.

^b At 100°C.

^c At 50°C.

^d At 0°C.

Sources: *ASM Handbooks, Volumes 1 and 2, Engineered Materials Handbooks, Volumes 1, 2, and 4, Metals Handbook: Properties and Selection: Non-ferrous Alloys and Pure Metals, Vol. 2, 9th edition, and Advanced Materials & Processes, Vol. 146, No. 4, ASM International, Materials Park, OH; Modern Plastics Encyclopedia 1977–1978, The McGraw-Hill Companies, New York, NY; and manufacturers' technical data sheets.*