

Table of Total Emissivity

These tables are presented for use as a guide when making infrared temperature measurements with the OMEGASCOPE® or other infrared pyrometers. The total emissivity (ϵ) for Metals, Non-metals and Common Building Materials are given.

Since the emissivity of a material will vary as a function of temperature and surface finish, the values in these tables should be used only as a guide for relative or delta measurements.

The exact emissivity of a material should be determined when absolute measurements are required.

METALS

Material	Temp °F (°C)	ϵ -Emissivity	Material	Temp °F (°C)	ϵ -Emissivity	Material	Temp °F (°C)	ϵ -Emissivity
Alloys			Polished	100 (38)	.81	Monel, Ni-Cu Oxid. at 1110°F (599)	1110 (599)	.46
20-Ni, 24-Cr, 55-Fe, Oxid.	392 (200)	.90	Highly Polished	100 (38)	.82	Nickel		
20-Ni, 24-Cr, 55-Fe, Oxid.	932 (500)	.97	Rollad	100 (38)	.84	Polished	100 (38)	.05
60-Ni, 12-Cr, 28-Fe, Oxid.	510 (270)	.89	Rough	100 (38)	.74	Oxidized	100-500 (138-260)	31-.46
60-Ni, 12-Cr, 28-Fe, Oxid.	1040 (560)	.82	Molten	1000 (538)	.15	Unoxidized	77 (25)	.05
80-Ni, 20-Cr, Oxidized	212 (100)	.87	Molten	1970 (1077)	.54	Unoxidized	212 (100)	.06
80-Ni, 20-Cr, Oxidized	1112 (600)	.87	Molten	2230 (1222)	.13	Unoxidized	932 (500)	.12
80-Ni, 20-Cr, Oxidized	2372 (1300)	.89	Nickel Plated	300-500 (38-260)	.37	Unoxidized	1832 (1000)	.19
Aluminium			Dow Metal	0.4-900 (1-18-316)	.15	Electrolytic	100 (38)	.04
Unoxidized	77 (25)	.02	Gold			Electrolytic	500 (260)	.08
Unoxidized	212 (100)	.03	Enamel	212 (100)	.17	Electrolytic	1000 (538)	.10
Unoxidized	932 (500)	.06	Plate (.0001)			Electrolytic	2000 (1093)	.16
Oxidized	390 (199)	.11	Plate on .0005 Silver	200-750 (93-399)	.11-.14	Nickel Oxide	5000-2000 (538-1093)	58-.86
Oxidized	1110 (599)	.19	Plate on .0005 Nickel	200-750 (93-399)	.07-.09	Palladium Plate (.00005		
Oxidized at 599°C (1110°F)	390 (199)	.11	Polished	300-500 (38-260)	.82	on .0005 silver)	200-750 (93-399)	16-.17
Oxidized at 599°C (1110°F)	1110 (599)	.19	Polished	1000-2000 (538-1093)	.83	Platinum		
Heavily Oxidized	200 (93)	.20	Haynes Alloy C,			Polished	100 (38)	.05
Heavily Oxidized	940 (500)	.31	Oxidized	600-2000 (316-1093)	.90-.96	"	500 (260)	.05
Highly Polished	212 (100)	.09	Haynes Alloy 25,			"	1000 (538)	.10
Roughly Polished	212 (100)	.16	Oxidized	600-2000 (316-1093)	.86-.89	Platinum, Black-		
Commercial Sheet	212 (100)	.09	Haynes Alloy X,			Polished	100 (38)	.93
Highly Polished Plate	440 (227)	.04	Oxidized	600-2000 (316-1093)	.85-.88	"	500 (260)	.96
Highly Polished Plate	1070 (577)	.06	Inconel Sheet	1000 (538)	.28	"	2000 (1093)	.91
Bright Rolled Plate	338 (170)	.04	Inconel Sheet	1200 (649)	.42	" Oxidized at 1100°F	500 (260)	.07
Bright Rolled Plate	932 (500)	.05	Inconel Sheet	1400 (760)	.58	"	1000 (538)	.11
Alloy A3003, Oxidized	400 (316)	.40	Inconel X, Polished	75 (24)	.29	Rhodium Flash (0.0002		
Alloy A3003, Oxidized	900 (482)	.40	Inconel B, Polished	75 (24)	.21	on 0.0005 Ni)	200-700 (93-371)	10-18
Alloy 1090-0	200-800 (93-427)	.05	Iron			Silver		
Alloy 245T	75 (24)	.09	Oxidized	212 (100)	.34	Plate (0.0005 on Ni)	200-700 (93-371)	06-.07
Alloy 245T, Polished	75 (24)	.09	Oxidized	930 (499)	.84	Polished	100 (38)	.01
Alloy 755T	75 (24)	.11	Oxidized	2190 (1199)	.89	"	500 (260)	.02
Alloy 755T, Polished	75 (24)	.08	Unoxidized	212 (100)	.89	"	1000 (538)	.03
Bismuth, Bright	176 (80)	.34	Red Rust	77 (25)	.70	"	2000 (1093)	.03
Bismuth, Unoxidized	77 (25)	.05	Rusted	77 (25)	.65	Steel		
Bismuth, Unoxidized	212 (100)	.06	Liquid	2760-3220 (1516-1773)	.42-.45	Cold Rolled	200 (93)	75-.85
Brass			Cast Iron			Ground Sheet	1720-2010 (938-1090)	55-.61
75% Cu, 25% Zn, Polished	476 (247)	.03	Oxidized	380 (199)	.64	Polished Sheet	100 (38)	.07
75% Cu, 25% Zn, Polished	674 (357)	.03	Oxidized	1110 (599)	.78	"	500 (260)	.10
62% Cu, 37% Zn, Polished	494 (257)	.03	Unoxidized	212 (100)	.21	"	1000 (538)	.14
62% Cu, 37% Zn, Polished	710 (377)	.04	Strong Oxidation	48 (104)	.85	Mild Steel, Polished	75 (24)	.10
83% Cu, 17% Zn, Polished	530 (277)	.03	Strong Oxidation	482 (250)	.95	Mild Steel, Smooth	75 (24)	.12
Matte	68 (20)	.07	Liquid	2795 (1535)	.29	Mild Steel,		
Burnished to Brown Colour	68 (20)	.40	Wrought Iron			Liquid	2910-3270 (1589-1793)	.28
Cu-Zn, Brass Oxidized	392 (200)	.61	Dull	77 (25)	.84	Steel, Unoxidized	212 (100)	.08
Cu-Zn, Brass Oxidized	752 (400)	.60	Dull	640 (349)	.94	Steel, Oxidized	77 (25)	.80
Cu-Zn, Brass Oxidized	1112 (600)	.61	Smooth	100 (38)	.35	Steel Alloys		
Unoxidized	77 (25)	.04	Polished	100 (38)	.28	Type 301, Polished	75 (24)	.27
Unoxidized	212 (100)	.04	Lead			Type 301, Polished	450 (232)	.57
Cadmium	77 (25)	.02	Polished	300-500 (38-260)	.06-.08	Type 301, Polished	1740 (949)	.55
Carbon			Rough	100 (38)	.43	Type 303, Oxidized	600-2000 (316-1093)	74-.87
Lampblack	77 (25)	.95	Oxidized	100 (38)	.43	Type 310, Rolled	1500-2100 (816-1149)	56-.81
Unoxidized	77 (25)	.81	Oxidized at 1100°F	100 (38)	.63	Type 316, Polished	75 (24)	.28
Unoxidized	212 (100)	.81	Gray Oxidized	100 (38)	.28	Type 316, Polished	450 (232)	.57
Unoxidized	932 (500)	.79	Magnesium	300-500 (38-260)	.07-.11	Type 316, Polished	1740 (949)	.66
Candle Soot	250 (121)	.96	Magnesium Oxide 2000-3140 (3027-1727)			Type 321	200-800 (93-427)	27-.32
Filament	500 (260)	.95	Mercury			Type 321 Polished	300-1500 (149-815)	18-49
Graphitized	212 (100)	.76	"	77 (25)	.20	Type 321 w/Br Oxide	200-800 (93-427)	66-.76
Graphitized	572 (300)	.75	"	100 (38)	.20	Type 347, Oxidized	600-2000 (316-1093)	87-.91
Graphitized	932 (500)	.71	"	212 (100)	.32	Type 350	200-800 (93-427)	18-27
Chromium	100 (38)	.06	Molybdenum			Type 350 Polished	300-1800 (149-882)	11-.35
Chromium	1000 (538)	.26	"	100 (38)	.06	Type 446, Polished	300-1500 (149-815)	15-.37
Chromium, Polished	302 (150)	.06	"	212 (100)	.32	Type 17-7 PH	200-600 (93-316)	44-.51
Cobalt, Unoxidized	932 (500)	.13	"	300 (150)	.06	Type 17-7 PH		
Cobalt, Unoxidized	1832 (1000)	.23	"	500 (260)	.08	Polished	300-1500 (149-815)	09-.16
Columbium, Unoxidized	1500 (816)	.19	"	1000 (538)	.11	Type C1020,		
Columbium, Unoxidized	2000 (1093)	.24	"	2000 (1093)	.28	Oxidized	600-2000 (316-1093)	87-.91
Copper			" Oxidized at 1000°F	600 (316)	.80	Type PH-15-7 MO	300-1200 (149-649)	07-.19
Cuprous Oxide	100 (38)	.87	" Oxidized at 1000°F	700 (373)	.84	Stellite, Polished	68 (20)	.18
Cuprous Oxide	500 (260)	.83	" Oxidized at 1000°F	800 (427)	.84	Tantalum, Unoxidized	1340 (727)	.14
Cuprous Oxide	1000 (538)	.77	" Oxidized at 1000°F	900 (482)	.83	"	2000 (1093)	.19
Black, Oxidized	100 (38)	.76	" Oxidized at 1000°F	1000 (538)	.82	"	1000 (538)	.26
Etched	100 (38)	.09	Monel, Ni-Cu	392 (200)	.41	"	5306 (2930)	.30
Matte	100 (38)	.22	Monel, Ni-Cu	752 (400)	.44	Ti, Unoxidized	77 (25)	.04
Roughly Polished	100 (38)	.07	Monel, Ni-Cu	1112 (600)	.46	"	212 (100)	.08
			Monel, Ni-Cu Oxidized	68 (20)	.43	Tinned Iron, Bright	76 (24)	.05
						"	212 (100)	.08