

Emissivitets tabel

Ved anvendelse af infrarød temperaturføler (pyrometer) er det en fordel at kende emissivitet (strålingsevnen) på de materialer der skal måles på for at kunne optimere målingen.

Emissiviteten er en funktion af temperaturen og der kan også være variationer på grund af materialets overflade.

Denne tabel bør derfor bruges som en vejledning.

Det anbefales at vejledning til forståelse og brug af infrarøde pyrometer læses.

Jernholdige og ikke jernholdige metaller

Material	Temp (°C)	Temp (°F)	-Emissivity	Material	Temp (°C)	Temp (°F)	-Emissivity
Alloys				Cu-Zn, Brass Oxidized	200	392	0.61
20-Ni, 24-CR, 55-FE, Oxidized	200	392	0.90	Cu-Zn, Brass Oxidized	400	752	0.60
20-Ni, 24-CR, 55-FE, Oxidized	500	932	0.97	Cu-Zn, Brass Oxidized	600	1112	0.61
60-Ni, 12-CR, 28-FE, Oxidized	270	518	0.89	Unoxidized	25	77	0.04
60-Ni, 12-CR, 28-FE, Oxidized	560	1040	0.82	Unoxidized	100	212	0.04
80-Ni, 20-CR, Oxidized	100	212	0.87	Cadmium	25	77	0.02
80-Ni, 20-CR, Oxidized	600	1112	0.87	Carbon			
80-Ni, 20-CR, Oxidized	1300	2372	0.89	Lampblack	25	77	0.95
Aluminium				Unoxidized	25	77	0.81
Unoxidized	25	77	0.02	Unoxidized	100	212	0.81
Unoxidized	100	212	0.03	Unoxidized	500	932	0.79
Unoxidized	500	932	0.06	Candle Soot	121	250	0.95
Oxidized	199	390	0.11	Filament	260	500	0.95
Oxidized	599	1110	0.19	Graphitized	100	212	0.76
Oxidized at 599°C	199	390	0.11	Graphitized	300	572	0.75
Oxidized at 599°C	599	1110	0.19	Graphitized	500	932	0.71
Heavily Oxidized	93	200	0.20	Chromium	38	100	0.08
Heavily Oxidized	504	940	0.31	Chromium	538	1000	0.26
Highly Polished	100	212	0.09	Chromium Polished	150	302	0.06
Roughly Polished	100	212	0.18	Cobalt, Unoxidized	500	932	0.13
Commercial Sheet	100	212	0.09	Cobalt, Unoxidized	1000	1832	0.23
Highly Polished Plate	227	440	0.04	Columbium, Unoxidized	816	1500	0.19
Highly Polished Plate	577	1070	0.06	Columbium, Unoxidized	1093	2000	0.24
Bright Rolled Plate	170	338	0.04	Copper			
Bright Rolled Plate	500	932	0.05	Cuprous Oxide	38	100	0.87
Alloy A3003, Oxidized	316	600	0.40	Cuprous Oxide	260	500	0.83
Alloy A3003, Oxidized	482	900	0.40	Cuprous Oxide	538	1000	0.77
Alloy 1100-0	93-427	200-800	0.05	Black, Oxidized	38	100	0.78
Alloy 24ST	24	75	0.09	Etched	38	100	0.09
Alloy 24ST Polished	24	75	0.09	Matte	38	100	0.22
Alloy 75ST	24	75	0.11	Roughly Polished	38	100	0.07
Alloy 75ST Polished	24	75	0.08	Polished	38	100	0.03
Bismuth, Bright	80	176	0.34	Highly Polished	38	100	0.02
Bismuth, Unoxidized	25	77	0.05	Rolled	38	100	0.64
Bismuth, Unoxidized	100	212	0.06	Rough	38	100	0.74
Brass				Molten	538	1000	0.15
73%Cu.27%Zn. Polished	247	476	0.03	Molten	1077	1970	0.16
73%Cu.27%Zn. Polished	357	674	0.03	Molten	1221	2230	0.13
62%Cu.37%Zn. Polished	257	494	0.03	Nickel Plated	38-260	100-500	0.37
62%Cu.37%Zn. Polished	377	710	0.04	Dow Metal	(18)-316	0-600	0.15
83%Cu.17%Zn. Polished	277	530	0.03				
Matte	20	68	0.07				
Burnished to Brown Colour	20	68	0.40				

Material	Temp (°C)	Temp (°F)	Emissivity	Material	Temp (°C)	Temp (°F)	Emissivity
Gold				Monel, Ni-Cu	600	1112	0.46
Enamel	100	212	0.37	Monel, Ni-Cu Oxidized	20	68	0.43
Plate (.0001)				Monel, Ni-Cu Oxidized at 599°C	599	1110	0.46
on .0005 Silver	93-399	200-750	.11-14	Nickel			
on .0005 Nickel	93-399	200-750	.07-09	Polished	38	100	0.05
Polished	38-260	100-500	0.02	Oxidized	38-260	100-500	.31-46
Polished	538-1093	1000-2000	0.03	Unoxidized	25	77	0.05
Haynes Alloy C, Oxidized	316-1093	600-2000	.90-.96	Unoxidized	100	212	0.06
Haynes Alloy 25, Oxidized	316-1093	600-2000	.86-.89	Unoxidized	500	932	0.12
Haynes Alloy X, Oxidized	316-1093	600-2000	.85-.88	Unoxidized	1000	1832	0.19
Inconel Sheet	538	1000	0.28	Electrolytic	38	100	0.04
Inconel Sheet	649	1200	0.42	Electrolytic	260	500	0.06
Inconel Sheet	760	1400	0.58	Electrolytic	538	1000	0.10
Inconel X, Polished	24	75	0.19	Electrolytic	1093	2000	0.16
Inconel B, Polished	24	75	0.21	Nickel Oxide	538-1093	1000-2000	.59-.86
Iron				Palladium Plate			
Oxidized	100	212	0.74	(.00005 on .0005 silver)	93-399	200-750	.16-17
Oxidized	499	930	0.84	Platinum	38	100	0.05
Oxidized	1199	2190	0.89	Platinum	260	500	0.05
Unoxidized	100	212	0.05	Platinum	538	1000	0.10
Red Rust	25	77	0.70	Platinum Black	38	100	0.93
Rusted	25	77	0.65	Platinum Black	260	500	0.96
Liquid	1516-1771	2760-3220	.42-.45	Platinum Black	1093	2000	0.97
Cast Iron				Platinum Black Oxidized at 593°C	260	500	0.07
Oxidized	199	390	0.64	Platinum Black Oxidized at 593°C	538	1000	0.11
Oxidized	599	1110	0.78	Rhodium Flash			
Unoxidized	100	212	0.21	(.0002 on .0005 Ni)	93-371	200-700	.10-.18
Strong Oxidation	40	104	0.95	Silver			
Strong Oxidation	250	482	0.95	Plate (.0005 on Ni)	93-371	200-700	.06-07
Liquid	1535	2795	0.29	Polished	38	100	0.01
Wrought Iron				Polished	260	500	0.02
Dull	25	77	0.94	Polished	538	1000	0.03
Dull	349	660	0.94	Polished	1093	2000	0.03
Smooth	38	100	0.35	Steel			
Polished	38	100	0.28	Cold Rolled	93	200	.75-.85
Lead				Ground Sheet	938-1099	1720-2010	.55-.61
Polished	38-260	100-500	.06-.08	Polished Sheet	38	100	0.07
Rough	38	100	0.43	Polished Sheet	260	500	0.10
Oxidized	38	100	0.43	Polished Sheet	538	1000	0.14
Oxidized at 593°C	38	100	0.63	Mild Steel, Polished	24	75	0.10
Gray Oxidized	38	100	0.28	Mild Steel, Polished Smooth	24	75	0.12
Magnesium	38-260	100-500	.07-.13	Mild Steel, Liquid	1599-1799	2910-3270	0.28
Magnesium Oxide	1027-1727	1880-3140	.16-.20	Steel, Unoxidized	100	212	0.08
Mercury	0	32	0.09	Steel Oxidized	25	77	0.80
Mercury	25	77	0.10	Steel Alloys			
Mercury	38	100	0.10	Type 301, Polished	24	75	0.27
Mercury	100	212	0.12	Type 301, Polished	232	450	0.57
Molybdenum	38	100	0.06	Type 301, Polished	949	1740	0.55
Molybdenum	260	500	0.08	Type 303, Oxidized	316-1093	600-2000	.74-.87
Molybdenum	538	1000	0.11	Type 310, Rolled	816-1149	1500-2100	.56-.81
Molybdenum	1093	2000	0.18	Type 316, Polished	24	75	0.28
Molybdenum Oxidized at 538°C	316	600	0.80	Type 316, Polished	232	450	0.57
Molybdenum Oxidized at 538°C	371	700	0.84	Type 316, Polished	949	1740	0.66
Molybdenum Oxidized at 538°C	427	800	0.84	Type 321	93-427	200-800	.27-.32
Molybdenum Oxidized at 538°C	482	900	0.83	Type 321 Polished	149-816	300-1500	.18-.49
Molybdenum Oxidized at 538°C	538	1000	0.82	Type 321 w/BK Oxide	93-427	200-800	.66-.76
Monel, Ni-Cu	200	392	0.41	Type 347, Oxidized	316-1093	600-2000	.87-.91
Monel, Ni-Cu	400	752	0.44	Type 350	93-427	200-800	.18-.27
				Type 350, Polished	149-982	300-1800	.11-.35
				Type 446, Polished	149-816	300-1500	.15-.37
				Type 17-7PH	93-316	200-600	.44-.51

Material	Temp (°C)	Temp (°F)	-Emissivity	Material	Temp (°C)	Temp (°F)	-Emissivity
Type 17-7PH Polished	149-816	300-1500	.09-.16	Light Buff	538	1000	0.80
Type C1020, Oxidised	316-1093	600-2000	.87-.91	Lime Clay	1371	2500	0.43
Type PH-15-7 MO	149-649	300-1200	.07-.19	Fire Brick	1000	1832	.75-.80
Stellite, Polished	20	68	0.18	Magnesite, Refractory	1000	1832	0.38
Tantalum				Gray Brick	1100	2012	0.75
Unoxidized	727	1340	0.14	Silica, Glazed	1093	2000	0.88
Unoxidized	1093	2000	0.19	Silica, Unglazed	1093	2000	0.80
Unoxidized	1982	3600	0.26	Sandlime	1371-2760	2500-5000	.59-.63
Unoxidized	2930	5306	0.30	Carborundum	1010	1850	0.92
Tin, Unoxidized	25	77	0.04	Ceramic			
Tin, Unoxidized	100	212	0.05	Alumina on Inconel	427-1093	800-2000	.69-.45
Tinned Iron, Bright	24	76	0.05	Earthenware, Glazed	21	70	0.90
Tinned Iron Bright	100	212	0.08	Earthenware, Matte	21	70	0.93
Titanium				Greens No. 5210-2C	93-399	200-750	.89-.82
Alloy C110M, Polished	149-649	300-1200	.08-.19	Coating No. C20A	93-399	200-750	.73-.87
Alloy C110M, Oxidised at 538°	93-427	200-800	.51-.61	Porcelain	22	72	0.92
Alloy T1-95A Oxidised at 538°	93-427	200-800	.35-.48	White Aluminium Oxide	93	200	0.90
Anodized onto SS	93-316	200-600	.96-.82	Zirconia on Inconel	427-1093	800-2000	.62-.45
Tungsten				Clay	20	68	0.39
Unoxidized	25	77	0.02	Clay Fired	70	158	0.91
Unoxidized	100	212	0.03	Clay Shale	20	68	0.69
Unoxidized	500	932	0.07	Clay Tiles, Light Red	1371-2760	2500-5000	.32-.34
Unoxidized	1000	1832	0.15	Clay Tiles, Red	1371-2760	2500-5000	.40-.51
Unoxidized	1500	2732	0.23	Clay Tiles, Dark Purple	1371-2760	2500-5000	0.78
Unoxidized	2000	3632	0.28	Concrete			
Filament (Aged)	38	100	0.03	Rough	0-1093	32-2000	0.94
Filament (Aged)	538	1000	0.11	Tiles, Natural	1371-2760	2500-5000	.63-.62
Filament (Aged)	2760	5000	0.35	Tiles, Brown	1371-2760	2500-5000	.87-.83
Uranium Oxide	1027	1880	0.79	Tiles Black	1371-2760	2500-5000	.94-.91
Zinc				Cotton Cloth	20	68	0.77
Bright Galvanized	38	100	0.23	Dolomite Lime	20	68	0.41
Commercial 99.1%	260	500	0.05	Emery Corundum	80	176	0.86
Galvanized	38	100	0.28	Glass			
Oxidized	260-538	500-1000	0.11	Convex D	100	212	0.80
Polished	38	100	0.02	Convex D	316	600	0.80
Polished	260	500	0.03	Convex D	500	932	0.76
Polished	538	1000	0.04	Nonex	100	212	0.82
Polished	1093	2000	0.06	Nonex	316	600	0.82
OTHER MATERIALS							
Adobe	20	68	0.90	Smooth	0-93	32-200	.92-.94
Asbestos				Granite	21	70	0.45
Board	38	100	0.96	Gravel	38	100	0.28
Cement	0-200	32-392	0.96	Gypsum	20	68	.80-.90
Cement Red	1371	2500	0.67	Ice, Smooth	0	32	0.97
Cement White	1371	2500	0.65	Ice Rough	0	32	0.96
Cloth	93	199	0.90	Lacquer			
Paper	38-371	100-700	0.93	Black	93	200	0.96
Slate	20	68	0.97	Blue, on Aluminum Foil	38	100	0.78
Asphalt, pavement	38	100	0.93	Clear, on Aluminum Foil (2 coat)	93	200	.08(.09)
Asphalt, tar paper	20	68	0.93	Clear, on Bright Copper	93	200	0.66
Basalt	20	68	0.72	Clear, on Tarnished Copper	93	200	0.64
Brick				Red, on Aluminum Foil (2 coat)	38	100	.61(.74)
Red, rough	21	70	0.93	White	93	200	0.95
Gault Cream	1371-2760	2500-5000	.26-.30	White, on Aluminum Foil (2 coat)	38	100	.69(.88)
Fire Clay	1371	2500	0.75	Yellow, on Aluminum Foil (2 coat)	38	100	.57(.79)

Material	Temp (°C)	Temp (°F)	-Emissivity	Material	Temp (°C)	Temp (°F)	-Emissivity
Lime Mortar	38-260	100-500 .....	.90-.92	Red Lead	100	212	0.93
Limestone	38	100	0.95	Rubber, Hard	23	74	0.94
Marble, White	38	100	0.95	Rubber, Soft, Gray	24	76	0.86
Marble, Smooth, White	38	100	0.56	Sand	20	68	0.76
Marble, Polished Gray	38	100	0.75	Sandstone	38	100	0.67
				Sandstone Red	38	100 .....	.60-.83
Oil on Nickel							
.001 Film	22	72	0.27	Sawdust	20	68	0.75
.002 Film	22	72	0.46	Shale	20	68	0.69
.005 Film	22	72	0.72	Silica Glazed	1000	1832	0.85
Thick Film	22	72	0.82	Silica Unglazed	1100	2012	0.75
Oil, Linseed							
On Aluminum Foil, uncoated	121	250	0.09	Silicon Carbide	149-649	300-1200 .....	.83-.96
On Aluminum Foil, 1 coat	121	250	0.56	Silk Cloth	20	68	0.78
On Aluminum Foil, 2 coats	121	250	0.51	Slate	38	100 .....	.67-80
On Polished Iron, .001 Film	38	100	0.22	Snow, Fine Particles	-7	20	0.82
On Polished Iron, .002 Film	38	100	0.45	Snow Granular	-8	18	0.89
On Polished Iron, .004 Film	38	100	0.65				
On Polished Iron, Thick Film	38	100	0.83				
Paints							
Blue, Cu ₂ O ₃	24	75	0.94	Soil			
Black, CuO	24	75	0.96	Surface	38	100	0.38
Green, Cu ₂ O ₃	24	75	0.92	Black Loam	20	68	0.66
Red, Fe ₂ O ₃	24	75	0.91	Plowed Field	20	68	0.38
White Al ₂ O ₃	24	75	0.94				
White Y ₂ O ₃	24	75	0.90	Soot			
White ZnO	24	75	0.95	Acetylene	24	75	0.97
White MgCO ₃	24	75	0.91	Camphor	24	75	0.94
White, ZrO ₂	24	75	0.95	Candle	121	250	0.95
White ThO ₂	24	75	0.90	Coal	20	68	0.95
White MgO ₂	4	75	0.91				
White PbCO ₃	24	75	0.93	Stonework	38	100	0.93
Yellow, PbO	24	75	0.90				
Yellow PbCrO ₄	24	75	0.93	Water	38	100	0.67
Paints, Aluminum	38	100 .....	.27-.67	Waterglass	20	68	0.96
10% Al	38	100	0.52				
20% Al	38	100	0.30	Wood	Low	Low .....	.80-.90
Dow XP-310	93	200	0.22	Beech, Planed	70	158	0.94
				Oak, Planed	38	100	0.91
Paints, Bronze	Low	Low .....	.34-.80	Spruce, Sanded	38	100	0.89
Gum Varnish (2 coats)	21	70	0.53				
Gum Varnish (3 coats)	21	70	0.50				
Cellulose Binder (2 coats)	21	70	0.34				
Paints, Oil							
All colours	93	200 .....	.92-.96				
Black	93	200	0.92				
Black Gloss	21	70	0.30				
Camouflage Green	52	125	0.85				
Flat Black	27	80	0.88				
Flat White	27	80	0.91				
Gray-Green	21	70	0.95				
Green	93	200	0.95				
Lamp Black	98	209	0.96				
Red	93	200	0.95				
White	93	200	0.94				
Quartz, Rough, Fused	21	70	0.93				
Glass, 1.96 mm	282	540	0.90				
Glass, 1.96 mm	838	1540	0.41				
Glass, 6.88 mm	282	540	0.93				
Glass, 6.88 mm	838	1540	0.47				
Opaque	299	570	0.92				
Opaque	838	1540	0.68				