Emissivity Table

Emissivity is a measure of a material's radiating efficiency. An emissivity of 1.00 implies that the material is 100% efficient at radiating energy. An emissivity of 0.20 implies that the material radiates only 20% of that which it is capable of radiating.

Tables of emissivity values are only approximated values for real materials. A range of emissivity values is usually given for many materials whose emissivity can be affected by surface roughness or finish. Additionally, thin sheets of material such as plastics may be semi-transparent in the infrared and therefore have reduced emissivity.

To optimize the surface temperature measurement of a material:

- Avoid reflections by shielding the material from surrounding high temperature objects.
- For semi-transparent materials such as plastic film, assure that the background is uniform and lower in temperature than the material.
- Conduct the measurement perpendicular to the material's surface whenever the emissivity is less than approximately 0.90. In all cases, do not exceed angles greater than 30 degrees from perpendicular.

Note: Applicable for material temperatures from 0 to 250°C

Alumel	
Unoxidized	0.10 – 0.25
Oxidized	0.60
Aluminum	
Polished	0.10 – 0.05
Oxidized	0.10 – 0.40
Rough	0.10 – 0.30
Anodized	0.60 – 0.95
Aluminum Oxide	0.40
Asbestos	0.95
Asphalt	0.90 – 1.00
Basalt	0.70
Bismuth	0.50
Brass	
Polished	0.05
Oxidized	0.50 - 0.60
Burnished	0.30
Carbon	
Unoxidized	0.40 – 0.90
Filament	0.50
Soot	0.50 - 0.95
Coke	0.95 – 1.00
Graphite	0.70 – 0.80
Carborundum	0.80 – 0.90
Ceramic	0.90 – 0.95
Clay	
Fired	0.95

Concrete	0.95
Chromel	
Oxidized	0.60 – 0.85
Chromium	0.10
Cobalt	0.20
Columbium	
Polished	0.20
Oxidized	0.70
Copper	
Polished	0.10
Oxidized	0.20 - 0.80
Electrical terminal blocks	0.60
Enamel	0.90
Foods	0.85 – 1.00
Formica	0.95
Mullite	0.80 – 0.85
Glass	
Convex D	0.80
Nonex	0.80
Plate	0.90 – 0.95
Fused quartz	0.75
Pyrex, lead and soda	0.95
Gold	0.05
Granite	
Polished	0.85
Rough	0.90
Natural	0.95
Gravel	0.90 – 0.95
Gypsum	0.85 – 0.95
Haynes Alloy	0.30 – 0.80
Human Skin	0.99
Inconel	
Polished	0.15
Oxidized	0.70 – 0.95
Sandblasted	0.30 – 0.66
Iron	
Polished	0.20
Oxidized	0.50 - 0.95

Rusted	0.50 – 0.70
Wrought, dull	0.90
Iron Oxide	0.85
Lacquer	
Colored on Al	0.75 – 0.90
Colored	0.95
Clear on Al	0.10
Clear on Cu	0.65
Lead	
Polished	0.05 – 0.10
Oxidized	0.30 – 0.65
Rough	0.40
Limestone	0.95 – 1.00
Magnesium Oxide	0.55
Molybdenum	
Polished	0.05
Oxidized	0.20 - 0.80
Monel	
Oxidized	0.45 – 0.85
Nichrome	
Clean	0.65
Oxidized	0.60 – 0.85
Nickel	
Polished	0.10
Oxidized	0.20 – 0.95
Nickel Oxide	0.60
Oil	
Animal/vegetable	0.95 – 1.00
Mineral	0.90 – 1.00
0.001” thick	0.25
0.002” thick	0.46
0.005” thick	0.70
Paint	
Aluminum paint	0.50
Bronze paint	0.80
Paint on metal	0.60 – 0.90
Paint on plastic or wood	0.80 – 0.95
Gold enamel	0.40
Clear silicone	0.65 – 0.80
Paper	0.85 – 1.00
Plaster	0.90
Plastic	0.95 – 1.00

Platinum	0.05
Polyester	0.75 – 0.85
Polyethylene	0.10
Quartz	0.90
Roofing Paper	0.90
Rubber	
Hard glossy	0.95
Soft rough	0.85
Sand	0.80 – 0.90
Sandstone	0.70
Shale	0.70
Silica	
Powder	0.35 – 0.60
Glazed	0.85
Unglazed	0.75
Silicone Carbide	0.80 – 0.95
Silver	0.05
Soil	
Dry	0.90 – 0.95
Wet	0.95 – 1.00
Slate	0.70 – 0.80
Stainless Steel	
Polished	0.10 – 0.15
Oxidized	0.45 - 0.95
Steel	
Unoxidized	0.10
Oxidized	0.70 - 0.95
Cold Rolled	0.70 – 0.90
Ground sheet	0.40 – 0.60
Rough surface	0.95
Tantalum	
Unoxidized	0.20
Oxidized	0.60
Textiles	
Carpet	0.85 – 1.00
Close weave	0.70 – 0.95
Cotton	0.80
Leather	0.95 – 1.00
Silk	0.80
Died black	0.98

Tin	
Unoxidized	0.05 – 0.10
Tungsten	
Unoxidized	0.05
Filament	0.30
Water	
Liquid	0.90 – 0.95
Ice	0.95 – 1.00
Snow	0.80 – 1.00
Wood	
Planed	0.80 – 0.95
Sawdust	0.75
Zinc	
Polished	0.05
Oxidized	0.10
Galvanized	0.20 – 0.30