Technical Information Data Bulletin

Metals - Typical Emissivity Values

TEMPERATURE & PROCESS INSTRUMENTS INC

	1.0 micron	1.6 micron	5.1 micron	8-14 microns
Aluminum				
Non-Oxidized	0.1-0.2	0.02-0.2	0.02-0.2	0.02-0.1
Oxidized	0.4	0.4	0.2-0.4	0.2-0.4
Alloy A 3003				
Oxidized	NA	0.4	0.4	0.3
Roughened	0.2-0.8	0.2-0.6	0.1-0.4	0.1-0.3
Polished	0.1-0.2	0.02-0.1	0.02-0.1	0.02-0.1
Brass				
Polished	0.8-0.95	0.01-0.05	0.01-0.05	0.01-0.05
Burnished	NA	NA	0.3	0.3
Oxidized	0.6	0.6	0.5	0.5
Carbon				
Non-oxidized	0.8-0.95	0.8-0.9	0.8-0.9	0.8-0.9
Graphite	0.8-0.9	0.8-0.9	0.7-0.9	0.7-0.8
Chromium	0.4	0.4	0.03-0.3	0.02-0.2
Copper				
Polished	0.05	0.03	0.03	0-03
Roughened	0.05-0.2	0.05-0.2	0.05-0.15	0.05-0.1
Oxidized	0.2-0.8	0.2-0.9	0.5-0.8	0.4-0.8
Gold	0.3	0.01-0.1	0.01-0.1	0.01-0.1
Haynes Alloy	NA	0.5-0.9	0.3-0.8	0.3-0.8
Inconel				
Oxidized	0.4-0.9	0.6-0.9	0.6-0.9	0.7-0.95
Sandblasted	0.3-0.4	0.3-0.6	0.3-0.6	0.3-0.6
Electro-polished	0.2-0.5	0.25	0.15	0.15
Iron				
Oxidized	0.4-0.8	0.5-0.9	0.6-0.9	0.5-0.9
Non-oxidized	0.35	0.1-0.3	0.05-0.25	0.05-0.2
Rusted	NA	0.6-0.9	0.5-0.8	0.5-0.7
Molten	0.35	0.4-0.6	NA	NA
Iron Cast				
Oxidized	0.7-0.9	0.7-0.9	0.65-0.95	0.6-0.95
Non-oxidized	0.35	0.3	0.25	0.2
Molten	0.35	0.3-0.4	0.2-0.3	0.2-0.3
Iron Wrought Dull	0.9	0.9	0.9	0.9
Lead				
Polished	0.35	0.05-0.2	0.05-0.2	0.05-0.1
Rough	0.65	0.6	0.4	0-4
Oxidized	NA	0.3-0.7	0.2-0.6	0.2-0.6
Magnesium	0.3-0.8	0.05-0.3	0.03-0.15	0.02-0.1
Mercury	NA	0.05-0.15	0.05-0.15	0.05-0.15
Molybdenum				
Oxidized	0.5-0.9	0.4-0.9	0.3-0.7	0.2-0.6
Non-oxidized	0.25-0.35	0.1-0.3	0.1-0.15	0.1
Monel (Ni-Cu)	0.3	0.2-0.6	0.1-0.5	0.1-0.14
Nickel				
Oxidized	0.8-0.9	0.4-0.7	0.3-0.6	0.2-0.5
Electrolytíc	0.2-0.4	0.1-0.3	0.1-0.15	0.05-0.15
Platinum				
Black -	NA	0.95	0.9	0.9
Silver	0.04	0.02	0.02	0.02
Steel				
Cold-Rolled	0.8-0.9	0.8-0.9	0.8-0.9	0.7-0.9
Ground Sheet	NA	NA	0.5-0.7	0.4-0.6
Polished Sheet	0.35	0.25	0.15	0.1
Molten	0.35	0.25-0.4	0.1-0.2	NA
Oxidized	0.8-0.9	0.8-0.9	0.7-0.9	0.7-0.9
Stainless	0.35	0.2-0.9	0.15-0.8	0.1-0.8
Tin (Non-oxidized)	0.25	0.1-0.3	0.05	0.05
Titanium				
Polished	0.5-0.75	0.3-0.5	0.1-0.3	0.05-0.2
Oxidized	NA-	0.6-0.8	0.5-0.7	0.5-0.6
Tungsten	NA	0.1-0.6	0.05-0.5	0.03
Polished	0.35-0.4	0.1-0.3	0.05-0.25	0.03-0.1
Zinc				
Oxidized	0.6	0.15	0.1	0.1
Polished	0.5	0.05	0.03	0.02

Temperature & Process Instruments Inc. **Visit us on the web at www.tnp-instruments.com**
1767 Central Avenue * Suite 112 * Yonkers * NY * USA * 10710 * Phone: (914) 673-0333 Fax: (866) 292-1456

Technical Information Data Bulletin

Non-metals - Typical Emissivity Values

	1.0 micron	1.6 micron	5.1 micron	8-14 microns
Asbestos	0.9	0.9	0.95	0.95
Asphalt	NA	0.95	0.95	0.95
Basalt	NA	0.7	0.7	0.7
Carborundum	NA	0.9	0.9	0.9
Ceramic	0.4	0.8-0.95	0.95	0.95
Clay	NA	0.8-0.95	0.95	0.95
Concrete	0.65	0.9	0.95	0.95
Cloth	NA	0.95	0.95	0.95
Glass				
Plate	NA	0.98	0.85	0.85
"Gob"	NA	0.9	NA	NA
Gravel	NA	0.95	0.95	0.95
Gypsum	NA	0.4-0.97	0.8-0.95	0.8-0.95
Ice	NA	NA	0.98	0.98
Limestone	NA	0.4-0.98	0.98	0.98
Paint -	NA	NA	0.9-0.95	0.9-0.95
Paper(any color)	NA	0.95	0.95	0.95
Plastic (opaque				
Over 20 mils)	NA	0.95	0.95	0.95
Rubber	NA	0.9	0.9	0.95
Sand	NA	0.9	0.9	0.9
Snow	NA	0.9	0.9	0.9
Soil	NA	NA	0.9-0.98	0.9-0.98
Water	NA	NA	0.93	0.93
Wood, Natural	NA	0.9-0.95	0.9-0.95	0.9-0.95

To optimize surface temperature measurements consider the following guidelines:

1. Determine the object emissivity using the suitable instrument for measurement.
2. Avoid reflections by shielding the object from surrounding high temperature sources.
3. For higher temperature objects use shorter wavelength instruments, whenever any overlap occurs.
4. For semi-transparent materials such as plastic films and glasses, assure that the background is uniform and lower in temperature than the object.
5. Mount the sensor perpendicularly to the surface whenever the emissivity is less than 0.9. In any case, do not exceed angles more than 30 degrees from incidence.

OPTCTLT15 - CT LT15 Compact Infrared Thermometer Sensor with LCD Display

OPTCTLT15 - CT LT15 Compact Infrared Thermometer Sensor with LCD Display

- **Temperature Range -58°F to 1112°F (-50°C to 600°C) scalable via programming keys or optional USB, RS232, interface and software**
- **High Optic Resolution of 15:1**
- **Spectral response 8 to 14µm**
- **Compact Size M12x1, 1.1 in. (28mm) long, stainless steel sensor housing**
- **Ambient temperature sensor head rugged and usable up to 356°F (180°C) ambient temperature without cooling**
- **Separate electronics housing with easy accessible programming keys and LCD backlit display**
- **IP 65 (NEMA-4) Sensing Head and Electronic Housing**
- **Emissivity 0.100 to 1.000 adjustable via programming keys and LCD backlit display**
- **Signal processing: Peak Hold, Valley Hold, Average; Extended hold function with Threshold and Hysteresis**
- **Scalable analog output: 0/4 to 20mA, 0 to 5V, 0 to 10 V, or Thermocouple Type K or J**

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