

# FAQ: Rechargeable Pro Thermal Imager TI270



**Q: Where can I find product specification and information to help me use my TI270?**

**A:** Refer to the TI270 Instruction Manual for detailed product specifications.

**Q: Which mobile devices are compatible for use with the Klein Tools TI270 Thermal Imager?**

**A:** The TI270 Thermal Imager is compatible with devices using Android® 7 or iOS 11 and higher.

**Q: What is Emissivity:**

**A:** Emissivity is a property which measures an object’s ability to emit or radiate thermal energy based on its material and the nature of its surface. Most organic, painted, or oxidized surfaces have emissivity values close to 0.95 (default). For specific details on the emissivity for various objects to use with your TI270, please review the Klein Tools Emissivity Settings Chart for Non-Metal and Metal Materials.

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## EMISSION CHART FOR NON-METAL MATERIALS

|                       |                       |          |                       |                              |               |                          |                             |                  |                       |                             |                           |           |          |
|-----------------------|-----------------------|----------|-----------------------|------------------------------|---------------|--------------------------|-----------------------------|------------------|-----------------------|-----------------------------|---------------------------|-----------|----------|
| <b>Asbestos</b>       |                       |          | <b>Dolomite Lime</b>  |                              |               | <b>Black, CuO</b>        |                             |                  | <b>Silica, Glazed</b> |                             |                           |           |          |
| Board                 | 100 (38)              | 0.96     |                       | 68 (20)                      | 0.41          |                          | Green, Cu2O3                | 75 (24)          | 0.92                  |                             | 2012 (1100)               | 0.75      |          |
| Cement                | 32-392 (0-200)        | 0.96     | <b>Emery Corundum</b> |                              |               |                          | Red, Fe2O3                  | 75 (24)          | 0.91                  | <b>Silicon Carbide</b>      |                           |           |          |
| Cement, Red           | 2500 (1371)           | 0.67     |                       | 176 (80)                     | 0.86          |                          | White, Al2O3                | 75 (24)          | 0.94                  |                             | 300-1200 (149-649)        | .83- .96  |          |
| Cement, White         | 2500 (1371)           | 0.65     | <b>Glass</b>          |                              |               |                          | White, Y2O3                 | 75 (24)          | 0.9                   | <b>Silk Cloth</b>           |                           |           |          |
| Cloth                 | 199 (93)              | 0.9      |                       | Convex D                     | 212 (100)     | 0.8                      | White, ZnO                  | 75 (24)          | 0.95                  |                             | 68 (20)                   | 0.78      |          |
| Paper                 | 100-700 (38-371)      | 0.93     |                       | Convex D                     | 600 (316)     | 0.8                      | White, MgCO3                | 75 (24)          | 0.91                  | <b>Slate</b>                |                           |           |          |
|                       |                       |          |                       | Convex D                     | 932 (500)     | 0.76                     | White, ZrO2                 | 75 (24)          | 0.95                  |                             | 100 (38)                  | .67- .80  |          |
| Slate                 | 68 (20)               | 0.97     |                       | Nonex                        | 212 (100)     | 0.82                     | White, ThO2                 | 75 (24)          | 0.9                   | <b>Snow, Fine Particles</b> |                           |           |          |
| Asphalt, pavement     | 100 (38)              | 0.93     |                       | Nonex                        | 600 (316)     | 0.82                     | White, MgO                  | 75 (24)          | 0.91                  |                             | 20 (-7)                   | 0.82      |          |
| Asphalt, tar paper    | 68 (20)               | 0.93     |                       | Nonex                        | 932 (500)     | 0.78                     | White, PbCO3                | 75 (24)          | 0.93                  | <b>Snow, Granular</b>       |                           |           |          |
| <b>Basalt</b>         |                       |          |                       | Smooth                       | 32-200 (0-93) | .92- .94                 | Yellow, PbO                 | 75 (24)          | 0.9                   |                             | 18 (-8)                   | 0.89      |          |
|                       | 68 (20)               | 0.72     | <b>Granite</b>        |                              |               | <b>Paints, Aluminium</b> |                             |                  | <b>Soil</b>           |                             |                           |           |          |
| <b>Brick</b>          |                       |          |                       | 70 (21)                      | 0.45          |                          |                             | 100 (38)         | .27- .67              |                             | Surface                   | 100 (38)  | 0.38     |
| Red, rough            | 70 (21)               | 0.93     | <b>Gravel</b>         |                              |               |                          | 10% Al                      | 100 (38)         | 0.52                  |                             | Black Loam                | 68 (20)   | 0.66     |
| Gault Cream           | 2500-5000 (1371-2760) | .26- .30 |                       | 100 (38)                     | 0.28          |                          | 26% Al                      | 100 (38)         | 0.3                   |                             | Plowed Field              | 68 (20)   | 0.38     |
| Fire Clay             | 2500 (1371)           | 0.75     | <b>Gypsum</b>         |                              |               |                          | Dow XP-310                  | 200 (93)         | 0.22                  | <b>Soot</b>                 |                           |           |          |
| Light Buff            | 1000 (538)            | 0.8      |                       | 68 (20)                      | .80- .90      | <b>Paints, Bronze</b>    |                             |                  |                       |                             | Acetylene                 | 75 (24)   | 0.97     |
| Lime Clay             | 2500 (1371)           | 0.43     | <b>Ice, Smooth</b>    |                              |               |                          |                             | Low              | .34- .80              |                             | Camphor                   | 75 (24)   | 0.94     |
| Fire Brick            | 1832 (1000)           | .75- .80 |                       | 32 (0)                       | 0.97          |                          | Gum Varnish (2 coats)       | 70 (21)          | 0.53                  |                             | Candle                    | 250 (121) | 0.95     |
| Magnesite, Refractory | 1832 (1000)           | 0.38     | <b>Ice, Rough</b>     |                              |               |                          | Gum Varnish (3 coats)       | 70 (21)          | 0.5                   |                             | Coal                      | 68 (20)   | 0.95     |
| Grey Brick            | 2012 (1100)           | 0.75     |                       | 32 (0)                       | 0.98          | <b>Paints, Oil</b>       |                             |                  |                       | <b>Stonework</b>            |                           |           |          |
| Silica, Glazed        | 2000 (1093)           | 0.88     | <b>Lacquer</b>        |                              |               |                          | Cellulose Binder (2 coats)  | 70 (21)          | 0.34                  |                             |                           | 100 (38)  | 0.93     |
| Silica, Unglazed      | 2000 (1093)           | 0.8      |                       | Black                        | 200 (93)      | 0.96                     | <b>Quartz, Rough, Fused</b> |                  |                       | <b>Water</b>                |                           |           |          |
| Sandlime              | 2500-5000 (1371-2760) | .59- .63 |                       | Blue, on Al Foil             | 100 (38)      | 0.78                     |                             | All colours      | 200 (93)              | .92- .96                    |                           | 100 (38)  | 0.67     |
| <b>Carborundum</b>    |                       |          |                       | Clear, on Al Foil (2 coats)  | 200 (93)      | .08- .09                 |                             | Black            | 200 (93)              | 0.92                        | <b>Waterglass</b>         |           |          |
|                       | 1850 (1010)           | 0.92     |                       | Clear, on Bright Cu          | 200 (93)      | 0.66                     |                             | Black Gloss      | 70 (21)               | 0.9                         |                           | 68 (20)   | 0.96     |
| <b>Ceramic</b>        |                       |          |                       | Clear, on Tarnished Cu       | 200 (93)      | 0.64                     |                             | Camouflage Green | 125 (52)              | 0.85                        | <b>Wood</b>               |           |          |
| Alumina on Inconel    | 800-2000 (427-1093)   | .69- .45 |                       | Red, on Al Foil (2 coats)    | 100 (38)      | .60- .74                 |                             | Flat Black       | 80 (27)               | 0.88                        |                           | Low       | .80- .90 |
| Earthenware, Glazed   | 70 (21)               | 0.9      |                       | White                        | 200 (93)      | 0.95                     |                             | Flat White       | 80 (27)               | 0.91                        | <b>Beech Planed</b>       |           |          |
| Earthenware, Matte    | 70 (21)               | 0.93     | <b>Lime Mortar</b>    |                              |               |                          | Grey-Green                  | 70 (21)          | 0.95                  |                             | 158 (70)                  | 0.94      |          |
| Greens No. 5210-2C    | 200-750 (93-399)      | .89- .82 |                       | White, on Al Foil (2 coats)  | 100 (38)      | .69- .88                 |                             | Green            | 200 (93)              | 0.95                        | <b>Oak, Planed</b>        |           |          |
| Coating No. C20A      | 200-750 (93-399)      | .73- .67 |                       | Yellow, on Al Foil (2 coats) | 100 (38)      | .57- .79                 |                             | Lamp Black       | 209 (98)              | 0.96                        |                           | 100 (38)  | 0.91     |
| Porcelain             | 72 (22)               | 0.92     | <b>Limestone</b>      |                              |               |                          | Red                         | 200 (93)         | 0.95                  |                             |                           |           |          |
| White Al2O3           | 200 (93)              | 0.9      |                       | 100-500 (38-260)             | .90- .92      |                          | White                       | 200 (93)         | 0.94                  | <b>Quartz, Rough, Fused</b> |                           |           |          |
| Zirconia on Inconel   | 800-2000 (427-1093)   | .62- .45 | <b>Marble, White</b>  |                              |               |                          | <b>Red Lead</b>             |                  |                       | <b>Sand</b>                 |                           |           |          |
| <b>Clay</b>           |                       |          |                       | 100 (38)                     | 0.95          |                          |                             | 212 (100)        | 0.93                  |                             |                           |           |          |
|                       | 68 (20)               | 0.39     | <b>Oil on Nickel</b>  |                              |               |                          | Glass, 1.98 mm              | 540 (282)        | 0.9                   | <b>Rubber, Hard</b>         |                           |           |          |
| Fired                 | 158 (70)              | 0.91     |                       | 0.001" Film                  | 72 (22)       | 0.27                     |                             |                  | 74 (23)               | 0.94                        | <b>Rubber, Soft, Grey</b> |           |          |
| Shale                 | 68 (20)               | 0.69     |                       | 0.002" Film                  | 72 (22)       | 0.46                     | <b>Rubber, Hard</b>         |                  |                       |                             |                           |           |          |
| Tiles, Light Red      | 2500-5000 (1371-2760) | .32- .34 |                       | 0.005" Film                  | 72 (22)       | 0.72                     |                             |                  | 76 (24)               | 0.86                        | <b>Sand</b>               |           |          |
| Tiles, Red            | 2500-5000 (1371-2760) | .40- .51 |                       | Thick" Film                  | 72 (22)       | 0.82                     |                             |                  |                       |                             |                           |           |          |
| Tiles, Dark Purple    | 2500-5000 (1371-2760) | 0.78     | <b>Oil, Linseed</b>   |                              |               |                          | <b>Sandstone</b>            |                  |                       |                             |                           |           |          |
|                       | 2500-5000 (1371-2760) | .40- .51 |                       | On Al Foil, uncoated         | 250 (121)     | 0.09                     | <b>Sandstone, Red</b>       |                  |                       |                             |                           |           |          |
|                       | 2500-5000 (1371-2760) | 0.78     |                       | On Al Foil, 1 coat           | 250 (121)     | 0.56                     | <b>Sawdust</b>              |                  |                       |                             |                           |           |          |
| <b>Concrete</b>       |                       |          |                       | On Al Foil, 2 coats          | 250 (121)     | 0.51                     |                             | 68 (20)          | 0.75                  | <b>Shale</b>                |                           |           |          |
| Rough                 | 32-2000 (0-1093)      | 0.94     |                       | On Polished Iron, .001 Film  | 100 (38)      | 0.22                     |                             |                  | 68 (20)               | 0.69                        |                           |           |          |
| Tiles, Natural        | 2500-5000 (1371-2760) | .63- .62 |                       | On Polished Iron, .002 Film  | 100 (38)      | 0.45                     |                             |                  |                       |                             |                           |           |          |
| Brown                 | 2500-5000 (1371-2760) | .87- .83 |                       | On Polished Iron, .004 Film  | 100 (38)      | 0.65                     |                             |                  |                       |                             |                           |           |          |
| Black                 | 2500-5000 (1371-2760) | .94- .91 |                       | On Polished Iron, Thick Film | 100 (38)      | 0.83                     |                             |                  |                       |                             |                           |           |          |
|                       | 2500-5000 (1371-2760) | .94- .91 |                       |                              |               |                          |                             |                  |                       |                             |                           |           |          |

## EMISSION CHART FOR METAL MATERIALS

|                            | Temp F° (C°)     | Emissivity |
|----------------------------|------------------|------------|
| <b>Alloys</b>              |                  |            |
| 20-Ni, 24-CR, 55-FE, Oxid. | 392 (200)        | 0.9        |
| 20-Ni, 24-CR, 55-FE, Oxid. | 932 (500)        | 0.97       |
| 60-Ni, 12-CR, 28-FE, Oxid. | 518 (270)        | 0.89       |
| 60-Ni, 12-CR, 28-FE, Oxid. | 1040 (560)       | 0.82       |
| 80-Ni, 20-CR, Oxidised     | 212 (100)        | 0.87       |
| 80-Ni, 20-CR, Oxidised     | 1112 (600)       | 0.87       |
| 80-Ni, 20-CR, Oxidised     | 2372 (1300)      | 0.89       |
| <b>Aluminium</b>           |                  |            |
| Unoxidised                 | 77 (25)          | 0.02       |
| Unoxidised                 | 212 (100)        | 0.03       |
| Unoxidised                 | 932 (500)        | 0.06       |
| Oxidised                   | 390 (199)        | 0.11       |
| Oxidised                   | 1110 (599)       | 0.19       |
| Oxidised at 1110°F (599°C) | 390 (199)        | 0.11       |
| Oxidised at 1110°F (599°C) | 1110 (599)       | 0.19       |
| Heavily Oxidised           | 200 (93)         | 0.2        |
| Heavily Oxidised           | 940 (504)        | 0.31       |
| Highly Polished            | 212 (100)        | 0.09       |
| Roughly Polished           | 212 (100)        | 0.18       |
| Commercial Sheet           | 212 (100)        | 0.09       |
| Highly Polished Plate      | 440 (227)        | 0.04       |
| Highly Polished Plate      | 1070 (577)       | 0.06       |
| Bright Rolled Plate        | 338 (170)        | 0.04       |
| Bright Rolled Plate        | 932 (500)        | 0.05       |
| Alloy A3003, Oxidised      | 600 (316)        | 0.4        |
| Alloy A3003, Oxidised      | 900 (482)        | 0.4        |
| Alloy 1100-0               | 200-800 (93-427) | 0.05       |
| Alloy 24ST                 | 75 (24)          | 0.09       |
| Alloy 24ST, Polished       | 75 (24)          | 0.09       |
| Alloy 75ST                 | 75 (24)          | 0.11       |
| Alloy 75ST, Polished       | 75 (24)          | 0.08       |
| <b>Bismuth, Bright</b>     |                  |            |
|                            | 176 (80)         | 0.34       |
| <b>Bismuth, Unoxidised</b> |                  |            |
|                            | 77 (25)          | 0.05       |
|                            | 212 (100)        | 0.06       |
| <b>Brass</b>               |                  |            |
| 73% Cu, 27% Zn, Polished   | 476 (247)        | 0.03       |
| 73% Cu, 27% Zn, Polished   | 674 (357)        | 0.03       |
| 62% Cu, 37% Zn, Polished   | 494 (257)        | 0.03       |
| 62% Cu, 37% Zn, Polished   | 710 (377)        | 0.04       |
| 83% Cu, 17% Zn, Polished   | 530 (277)        | 0.03       |
| Matte                      | 68 (20)          | 0.07       |
| Burnished to Brown Colour  | 68 (20)          | 0.4        |
| Cu-Zn, Brass Oxidised      | 392 (200)        | 0.61       |
| Cu-Zn, Brass Oxidised      | 752 (400)        | 0.6        |
| Cu-Zn, Brass Oxidised      | 1112 (600)       | 0.61       |
| Unoxidised                 | 77 (25)          | 0.04       |
| Unoxidised                 | 212 (100)        | 0.04       |
| Unoxidised                 | 77 (25)          | 0.02       |
| <b>Carbon</b>              |                  |            |
| Lampblack                  | 77 (25)          | 0.95       |
| Unoxidised                 | 77 (25)          | 0.81       |
| Unoxidised                 | 212 (100)        | 0.81       |
| Unoxidised                 | 932 (500)        | 0.79       |
| Candle Soot                | 250 (121)        | 0.95       |
| Filament                   | 500 (260)        | 0.95       |
| Graphitized                | 212 (100)        | 0.76       |
| Graphitized                | 572 (300)        | 0.75       |
| Graphitized                | 932 (500)        | 0.71       |

|                              | Temp F° (C°)          | Emissivity |
|------------------------------|-----------------------|------------|
| <b>Chromium</b>              |                       |            |
|                              | 100 (38)              | 0.08       |
|                              | 1000 (538)            | 0.26       |
| <b>Chromium, Polished</b>    |                       |            |
|                              | 302 (150)             | 0.06       |
| <b>Cobalt, Unoxidised</b>    |                       |            |
|                              | 932 (500)             | 0.13       |
|                              | 1832 (1000)           | 0.23       |
| <b>Columbium, Unoxidised</b> |                       |            |
|                              | 1500 (816)            | 0.19       |
|                              | 2000 (1093)           | 0.24       |
| <b>Copper</b>                |                       |            |
| Cuprous Oxide                | 100 (38)              | 0.87       |
| Cuprous Oxide                | 500 (260)             | 0.83       |
| Cuprous Oxide                | 1000 (538)            | 0.77       |
| Black, Oxidised              | 100 (38)              | 0.78       |
| Etched                       | 100 (38)              | 0.09       |
| Matte                        | 100 (38)              | 0.22       |
| Roughly Polished             | 100 (38)              | 0.07       |
| Polished                     | 100 (38)              | 0.03       |
| Highly Polished              | 100 (38)              | 0.02       |
| Rolled                       | 100 (38)              | 0.64       |
| Rough                        | 100 (38)              | 0.74       |
| Molten                       | 1000 (538)            | 0.15       |
| Molten                       | 1970 (1077)           | 0.16       |
| Molten                       | 2230 (1221)           | 0.13       |
| Nickel Plated                | 100-500 (38-260)      | 0.37       |
| <b>Dow Metal</b>             |                       |            |
|                              | 0.4-600 (-18-316)     | 0.15       |
| <b>Gold</b>                  |                       |            |
| Enamel                       | 212 (100)             | 0.37       |
| Plate on .0005 Silver        | 200-750 (93-399)      | .11- .14   |
| Plate on .0005 Nickel        | 200-750 (93-399)      | .07- .09   |
| Polished                     | 100-500 (38-260)      | 0.02       |
| Polished                     | 1000-2000 (538-1093)  | 0.03       |
| <b>Haynes Alloy C,</b>       |                       |            |
| Oxidised                     | 600-2000 (316-1093)   | .90- .96   |
| <b>Haynes Alloy 25,</b>      |                       |            |
| Oxidised                     | 600-2000 (316-1093)   | .86- .89   |
| <b>Haynes Alloy X,</b>       |                       |            |
| Oxidised                     | 600-2000 (316-1093)   | .85- .88   |
| <b>Inconel Sheet</b>         |                       |            |
|                              | 1000 (538)            | 0.28       |
|                              | 1200 (649)            | 0.42       |
|                              | 1400 (760)            | 0.58       |
| <b>Inconel X, Polished</b>   |                       |            |
|                              | 75 (24)               | 0.19       |
| <b>Inconel B, Polished</b>   |                       |            |
|                              | 75 (24)               | 0.21       |
| <b>Iron</b>                  |                       |            |
| Oxidised                     | 212 (100)             | 0.74       |
| Oxidised                     | 930 (499)             | 0.84       |
| Oxidised                     | 2190 (1199)           | 0.89       |
| Unoxidised                   | 212 (100)             | 0.05       |
| Red Rust                     | 77 (25)               | 0.7        |
| Rusted                       | 77 (25)               | 0.65       |
| Liquid                       | 2760-3220 (1516-1771) | .42- .45   |

| Cast Iron                                |                          |         |
|------------------------------------------|--------------------------|---------|
| Oxidised                                 | 390 (199)                | 0.64    |
| Oxidised                                 | 1110 (599)               | 0.78    |
| Unoxidised                               | 212 (100)                | 0.21    |
| Strong Oxidation                         | 40 (104)                 | 0.95    |
| Strong Oxidation                         | 482 (250)                | 0.95    |
| Liquid                                   | 2795 (1535)              | 0.29    |
| Wrought Iron                             |                          |         |
| Dull                                     | 77 (25)                  | 0.94    |
| Dull                                     | 660 (349)                | 0.94    |
| Smooth                                   | 100 (38)                 | 0.35    |
| Polished                                 | 100 (38)                 | 0.28    |
| Lead                                     |                          |         |
| Polished                                 | 100-500<br>(38-260)      | .06-.08 |
| Rough                                    | 100 (38)                 | 0.43    |
| Oxidised                                 | 100 (38)                 | 0.43    |
| Oxidised at 1100                         | 100 (38)                 | 0.63    |
| Gray Oxidised                            | 100 (38)                 | 0.28    |
| Magnesium                                |                          |         |
|                                          | 100-500<br>(38-260)      | .07-.13 |
| Magnesium Oxide                          |                          |         |
|                                          | 1880-3140<br>(1027-1727) | .16-.20 |
| Mercury                                  |                          |         |
|                                          | 32 (0)                   | 0.09    |
|                                          | 77 (25)                  | 0.1     |
|                                          | 100 (38)                 | 0.1     |
|                                          | 212 (100)                | 0.12    |
| Molybdenum                               |                          |         |
|                                          | 100 (38)                 | 0.06    |
|                                          | 500 (260)                | 0.08    |
|                                          | 1000 (538)               | 0.11    |
|                                          | 2000 (1093)              | 0.18    |
| Monel, Ni-Cu                             |                          |         |
|                                          | 392 (200)                | 0.41    |
|                                          | 752 (400)                | 0.44    |
|                                          | 1112 (600)               | 0.46    |
| Monel, Ni-Cu Oxidised                    |                          |         |
|                                          | 68 (20)                  | 0.43    |
| Monel, Ni-Cu Oxid. at 1110degF           |                          |         |
|                                          | 1110 (599)               | 0.46    |
| Nickel                                   |                          |         |
| Polished                                 | 100 (38)                 | 0.05    |
| Oxidised                                 | 100-500<br>(38-260)      | .31-.46 |
| Unoxidised                               | 77 (25)                  | 0.05    |
| Unoxidised                               | 212 (100)                | 0.06    |
| Unoxidised                               | 932 (500)                | 0.12    |
| Unoxidised                               | 1832 (1000)              | 0.19    |
| Electrolytic                             | 100 (38)                 | 0.04    |
| Electrolytic                             | 500 (260)                | 0.06    |
| Electrolytic                             | 1000 (538)               | 0.1     |
| Electrolytic                             | 2000 (1093)              | 0.16    |
| Nickel Oxide                             |                          |         |
|                                          | 1000-2000<br>(538-1093)  | .59-.86 |
| Palladium Plate (.00005 on .0005 silver) |                          |         |
|                                          | 200-750<br>(93-399)      | .16-.17 |
| Platinum                                 |                          |         |
|                                          | 100 (38)                 | 0.05    |