## Revised Thermocouple Reference Tables

Reference Tables N.I.S.T. Monograph 175 Revised to ITS-90





Iron vs. Copper-Nickel

Extension Grade



## MAXIMUM TEMPERATURE RANGE Thermocouple Grade

Thermocouple Gra 32 to 1382°F 0 to 750°C

Extension Grade 32 to 392°F 0 to 200°C

LIMITS OF ERROR (whichever is greater) Standard: 2.2°C or 0.75% Special: 1.1°C or 0.4%

## COMMENTS, BARE WIRE ENVIRONMENT:

Reducing, Vacuum, Inert; Limited Use in Oxidizing at High Temperatures; Not Recommended for Low Temperatures

TEMPERATURE IN DEGREES °C REFERENCE JUNCTION AT 0°C

## Thermoelectric Voltage in Millivolts °C -10 -9 -8 -5 -4 -3 -2 °C 0 10 °C -6 -8.037 -8.017 -7.996 -7.976 -7.955 -7.934 -200 -8.076 -8.057 -7.890 -8.095 27.393 27.953 28.516 27.449 27.505 28.010 28.066 28.572 28.629 29.137 29.194 29.704 29.761 27.617 27.673 28.178 28.234 28.741 28.798 29.307 29.363 29.874 29.931 -7.868 -7.634 -7.376 -7.094 -7.846 -7.610 -7.348 -7.824 -7.585 -7.321 -7.035 -6.727 -7.801 -7.559 -7.293 -7.778 -7.534 -7.265 -6.975 -6.663 -7.755 -7.508 -7.237 -7.731 -7.482 -7.209 -7.683 -7.429 -7.152 27.729 28.291 28.854 29.420 29.988 27.785 28.347 28.911 29.477 27.897 28.460 29.024 29.590 -7.659 -7.403 27.561 28.122 27.841 28.403 -7.707 -7.456 28.516 29.080 29.647 30.216 -180 -7.659-180 28.685 29.250 29.818 28.967 29.534 30.102 -7.123 -170 -7.403-7.181 -170 520 520 -7.064 -6.759 -7.005 -6.695 -6 944 -6.914 -6.598 -6.883 -6.566 -6.467 -6.124 -5.764 -5.388 -6.400 -6.054 -5.690 -6.366 -6.018 -5.653 -5.272 -6.332 -5.982 -5.616 -5.233 -6.298 -5.946 -5.578 -5.194 -6.263 -5.910 -5.541 -5.155 -6.229 -5.874 -5.503 -5.116 -6.194 -5.838 -5.465 -6.159 -5.801 -5.426 30.273 30.845 31.419 30.330 30.902 31.477 30.387 30.960 31.535 32.113 30.444 31.017 31.592 32.171 30.502 31.074 31.650 32.229 30.559 31.132 31.708 30.616 31.189 31.766 30.673 31.247 31.823 30.730 31.304 31.881 30.788 31.362 31.939 -140 -6.433 -6.089 -5.727 -5.350 570 31.362 -5.801-110 -5 426 -5.076 -5.037 580 31 939 31 997 32 055 32 287 32 345 32 403 32 461 32.810 33.337 33.395 33.454 33.925 33.984 34.043 34.516 34.575 34.635 35.111 35.171 35.230 35.710 35.770 35.830 33.278 33.866 34.457 35.051 33.513 34.102 34.694 35.290 35.890 600 33.807 34.397 34.992 35.590 -4.130 -3.698 -3.255 -2.801 -4.088 -3.654 -3.210 -2.755 -4.425 -4.002 -3.566 -3.120 -2.663 -3.959 -3.522 -3.075 -2.617 -3.916 -3.478 -3.029 -2.571 -80 -70 -4.173 -3.742 -3.300 -2.847 -4.045 -3.610 -3.872 -3.434 -3.829 -3.389 -3.786 -3.344 -80 -70 33.689 34.279 33.748 34.338 34.161 34.754 34.220 34.813 34.279 34.873 -3.786 620 -3.165 -2.709 -2.984 -2.524 35.350 35.950 3 344 -60 -50 36.312 36.373 36.918 36.979 37.528 37.590 -40 650 -1.722 -1.239 -0.749 -40 -30 -20 -10 36.797 37.406 37.040 37.651 37.162 37.773 -1.865 -1.385 -1.818 -1.336 -1.770 -1.288 -1.674 -1.190 -1.626 -1.142 -1.578 -1.093 660 670 36.675 37.284 36.736 37.345 36.858 37.467 37.101 37.712 37.223 37.835 -10 -0.946-0.896-0.847-0.798-0.699-0.650-0.600-0.550-0.50137.958 38.019 38.081 38.142 38.204 38.265 38.327 38.389 38.450 -0.351 -0.301 -0.251 -0.201 -0.151 -0.101 -0.050 0.000 38.636 38.760 38.822 38.884 38.946 39.008 0.303 39.381 0.000 0.050 0.405 0.507 39,443 39.505 0.101 39.630 0.558 0.609 0.711 1.226 1.745 0.762 1.277 1.797 0.814 1.329 0.865 1.381 1.902 0.916 1.433 1.954 0.968 1.485 1.019 1.537 39.755 40.382 39.818 40.445 41.075 39.880 40.508 41.138 39.943 40.005 40.068 40.131 40.570 40.633 40.696 40.759 41.201 41.265 41.328 41.391 40.193 40.256 40.822 40.886 41.455 41.518 40.319 40.382 40.949 41.012 41.581 41.645 10 20 30 40 1.849 41 835 41 899 41 962 42 026 42 090 42 153 42.281 42.344 42.408 42.472 42.536 42.599 42.663 42.727 42.791 42.919 42.983 43.047 43.111 43.175 43.239 43.303 43.367 43.431 43.559 43.624 43.688 43.752 43.817 43.881 43.945 44.010 44.074 44.203 44.267 44.324 44.396 44.461 44.525 44.590 44.655 44.719 44.848 44.913 44.977 45.042 45.107 45.171 45.236 45.301 45.365 42.855 42.919 43.495 43.559 44.139 44.203 44.784 44.848 45.430 45.494 2.903 3.169 3.703 4.240 3.222 3.757 4.294 3.275 3.810 4.348 3.382 3.918 4.456 4.997 3.436 3.971 4.510 3.116 3.329 3.489 3.543 3.596 60 70 80 90 60 70 80 90 3.864 4.402 4.943 4.025 4.564 4.133 4.672 4.079 4.187 5.052 5.160 45.753 45.818 45.882 46.399 46.464 46.528 47.044 47.109 47.173 47.688 47.753 47.817 45.624 46.270 46.915 47.560 45.688 46.334 46.980 47.624 5.269 5.814 5.323 5.868 5.378 5.923 5.432 5.977 100 46.593 47.238 47.881 6 196 46 657 6.032 6.087 6 141 6 251 6.306 6.360 810 46 141 46 205 46 722 46.786 47.431 6.689 7.239 7.789 6.415 6.579 7.129 6.744 7.294 6.799 7.349 6.854 7.404 6.909 7.459 46.786 47.431 46.851 47.495 47.302 47.946 47.367 48.010 48.074 48.138 48.202 48.267 48.331 48.395 48.459 48.523 48.587 49.290 49.353 49.926 49.989 50.559 50.622 51.188 51.27 51.217 8.120 8.673 9.226 9.780 48.907 48.971 49.034 49.098 49.544 49.608 49.672 49.735 50.179 50.243 50.306 50.369 50.811 50.874 50.937 51.000 51.439 51.502 51.565 51.627 8.286 8.839 8.396 8.949 48.779 49.417 8.618 9.171 9.725 8.783 9.337 9.891 10.446 8.728 8.894 9.448 9.005 9.559 9.115 49.353 49,481 49.799 49.862 160 170 8.562 9.115 9.060 160 170 860 860 9.503 10.057 10.612 50.432 50.495 51.063 51.126 51.690 51.752 9.392 9.947 50.052 50.685 50.116 50.748 9 282 9.614 870 49 989 10.002 10.279 10.501 51.251 51.314 51.377 10.224 10.335 10.390 10.557 10.668 51.815 51.877 52.064 52.686 53.304 53.919 54.530 52.127 52.189 52.251 52.748 52.810 52.872 53.366 53.427 53.489 53.980 54.041 54.102 54.591 54.652 54.713 52.314 52.934 53.550 54.164 54.773 52.376 52.996 53.612 54.225 54.834 10.834 11.389 11.945 10.890 11.445 12.000 10.945 11.501 12.056 12.611 13.167 11.001 11.556 12.111 11.056 11.612 12.167 12.722 13.278 11.112 11.667 12.222 11.167 11.723 12.278 12.833 13.389 51.877 51.940 52.500 52.562 53.119 53.181 53.735 53.796 52.002 52.624 53.243 52.438 53.057 53.673 54.286 52.500 53.119 53.735 54.347 11.223 11.778 11.334 11.889 11.834 910 12.334 220 12.389 12.445 220 920 54.956 55.561 56.164 55.077 55.682 56.284 56.883 55.138 55.742 56.344 56.942 55.198 55.803 56.404 57.002 55.259 55.863 56.464 57.062 55.319 55.923 56.524 57.121 55.380 55.983 56.584 57.181 55.440 56.043 56.643 57.240 14.110 14.665 15.219 14.166 14.720 15.275 13.944 14.499 15.053 15.607 14.554 15.109 15.663 55.622 56.224 56.104 56.703 57.300 56.164 56.763 57.360 14.221 14.776 15.330 14.277 14.831 14.332 14.887 14.388 14.942 14.443 14.998 14.609 15.164 14.665 15.219 960 970 270 15 386 15 441 15 496 15 552 15 718 56 763 56.823 1000 300 16.383 16.493 16.549 16.604 16.659 16.715 16.825 16.881 300 1000 57.953 58.013 58.072 58.131 58.190 58.249 58.309 58.368 58.427 16.936 17.489 16.991 17.544 17.046 17.599 18.152 17.102 17.655 18.207 17.157 17.710 17.268 17.820 18.373 58.663 59.252 59.838 58.722 59.310 59.897 58.781 58.840 58.899 59.369 59.428 59.487 59.956 60.014 60.073 58.957 59.545 60.131 59.016 59.604 59.075 59.663 59.134 59.721 17.212 17.765 17.323 17.876 17.378 17.931 58.545 59.134 58.604 59.193 320 18.041 18.097 18.262 18.318 60.190 18.925 60.482 60.540 60.599 60.657 60.774 350 19 090 19 146 19 311 19 366 19 422 19 477 19 532 19 587 350 1050 60 890 60 949 61 007 61 065 61 123 61 182 61 240 61 356 61 415 61 473 1050 19.697 20.249 19.753 20.304 19.808 20.359 19.863 19.918 20.414 20.469 20.966 21.021 19.973 20.525 20.028 20.580 20.083 20.635 20.139 20.690 21.241 20.194 20.745 61.473 61.531 61.589 62.054 62.112 62.170 61.047 61.705 61.763 61.822 61.880 61.938 62.228 62.286 62.344 62.402 62.406 62.518 62.806 62.286 62.294 62.982 63.040 63.098 63.387 63.445 63.503 63.561 63.619 63.677 61.996 62.054 62.576 62.634 20.800 20.855 20.911 21.076 21.131 21.186 62.634 62.750 63.156 63.214 21 793 21.848 21.903 21.958 22.014 22.069 22.124 22.179 22.234 22.400 22.455 22.510 22.565 22.620 22.676 22.731 22.786 22.952 23.007 23.062 23.117 23.72 23.228 23.283 23.338 23.504 23.55 23.614 23.670 23.725 23.780 23.835 23.891 24.057 24.112 24.167 24.223 24.278 24.333 24.389 24.444 22.234 22.289 22.786 22.841 23.338 23.393 23.891 23.946 22.345 1100 63.792 63.850 63.908 63.966 64.024 64.081 64.139 64.197 22.896 22.952 23.449 23.504 24.001 24.057 64.370 64.428 64.486 64.544 64.602 64.659 64.717 64.775 64.833 64.890 64.948 64.948 65.006 65.125 65.126 65.832 65.410 65.468 65.525 65.583 65.641 65.699 65.756 65.841 65.872 65.925 65.987 66.045 66.102 1110 24 499 1140 66.102 66.160 66.218 66.275 66.333 66.391 66.448 66.506 66.564 24.776 24.832 24.887 24.943 24.998 25.053 66.679 66.737 66.794 66.852 66.910 66.967 67.025 67.082 67.140 24.665 24.721 25.164 25.220 25.275 25.331 25.386 25.442 25.497 25.553 25.608 25.664 25.720 25.775 25.831 25.886 25.942 25.998 26.053 26.109 26.165 26.220 26.276 26.276 26.332 26.387 26.443 26.499 26.555 26.610 26.666 26.722 26.778 26.834 26.889 26.945 27.001 27.057 27.113 27.169 27.225 27.281 27.337 27.393 67.255 67.313 67.370 67.428 67.486 67.543 67.601 67.658 67.716 67.773 67.831 67 460 1160 1160 470 480 1170 1180 1190 °C °C 0 6 8 10 0 2 3 5 8 10