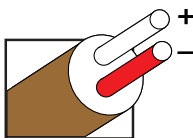


# Revised Thermocouple Reference Tables

## TYPE J

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



Thermocouple Grade

MAXIMUM TEMPERATURE RANGE

Thermocouple Grade

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

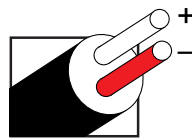
Oxidizing at High Temperatures;

Not Recommended for Low Temperatures

TEMPERATURE IN DEGREES °C

REFERENCE JUNCTION AT 0°C

Iron  
vs.  
Copper-Nickel



Extension Grade

### Thermoelectric Voltage in Millivolts

| °C   | -10    | -9     | -8     | -7     | -6     | -5     | -4     | -3     | -2     | -1     | 0      | °C   |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------|
| -200 | -8.095 | -8.076 | -8.057 | -8.037 | -8.017 | -7.996 | -7.976 | -7.955 | -7.934 | -7.912 | -7.890 | -200 |
| -190 | -7.890 | -7.868 | -7.846 | -7.824 | -7.801 | -7.778 | -7.755 | -7.731 | -7.707 | -7.683 | -7.659 | -190 |
| -180 | -7.659 | -7.634 | -7.610 | -7.585 | -7.559 | -7.534 | -7.508 | -7.482 | -7.456 | -7.429 | -7.403 | -180 |
| -170 | -7.403 | -7.376 | -7.348 | -7.321 | -7.293 | -7.265 | -7.237 | -7.209 | -7.181 | -7.152 | -7.123 | -170 |
| -160 | -7.123 | -7.094 | -7.064 | -7.035 | -7.005 | -6.975 | -6.944 | -6.914 | -6.883 | -6.853 | -6.821 | -160 |
| -150 | -6.821 | -6.790 | -6.759 | -6.727 | -6.695 | -6.663 | -6.631 | -6.598 | -6.566 | -6.533 | -6.500 | -150 |
| -140 | -6.500 | -6.467 | -6.433 | -6.400 | -6.366 | -6.332 | -6.298 | -6.263 | -6.229 | -6.194 | -6.159 | -140 |
| -130 | -6.159 | -6.124 | -6.089 | -6.054 | -6.018 | -5.982 | -5.946 | -5.910 | -5.874 | -5.838 | -5.801 | -130 |
| -120 | -5.801 | -5.764 | -5.727 | -5.690 | -5.653 | -5.616 | -5.578 | -5.541 | -5.503 | -5.465 | -5.426 | -120 |
| -110 | -5.426 | -5.388 | -5.350 | -5.311 | -5.272 | -5.233 | -5.194 | -5.155 | -5.116 | -5.076 | -5.037 | -110 |
| -100 | -5.037 | -4.997 | -4.957 | -4.917 | -4.877 | -4.836 | -4.796 | -4.755 | -4.714 | -4.674 | -4.633 | -100 |
| -90  | -4.633 | -4.591 | -4.550 | -4.509 | -4.467 | -4.425 | -4.384 | -4.342 | -4.300 | -4.257 | -4.215 | -90  |
| -80  | -4.215 | -4.173 | -4.130 | -4.088 | -4.045 | -4.002 | -3.959 | -3.916 | -3.872 | -3.829 | -3.786 | -80  |
| -70  | -3.786 | -3.742 | -3.698 | -3.654 | -3.610 | -3.566 | -3.522 | -3.478 | -3.434 | -3.389 | -3.344 | -70  |
| -60  | -3.344 | -3.300 | -3.255 | -3.210 | -3.165 | -3.120 | -3.075 | -3.029 | -2.984 | -2.938 | -2.893 | -60  |
| -50  | -2.893 | -2.847 | -2.801 | -2.755 | -2.709 | -2.663 | -2.617 | -2.571 | -2.524 | -2.478 | -2.431 | -50  |
| -40  | -2.431 | -2.385 | -2.338 | -2.291 | -2.244 | -2.197 | -2.150 | -2.103 | -2.055 | -2.008 | -1.961 | -40  |
| -30  | -1.961 | -1.913 | -1.865 | -1.818 | -1.770 | -1.722 | -1.674 | -1.626 | -1.578 | -1.530 | -1.482 | -30  |
| -20  | -1.482 | -1.433 | -1.385 | -1.337 | -1.288 | -1.239 | -1.190 | -1.142 | -1.093 | -1.044 | -0.995 | -20  |
| -10  | -0.995 | -0.946 | -0.896 | -0.846 | -0.796 | -0.746 | -0.695 | -0.645 | -0.594 | -0.543 | -0.491 | -10  |
| 0    | -0.501 | -0.451 | -0.401 | -0.351 | -0.301 | -0.251 | -0.201 | -0.151 | -0.101 | -0.050 | 0.000  | 0    |
| 0    | 0.000  | 0.050  | 0.101  | 0.151  | 0.202  | 0.253  | 0.303  | 0.354  | 0.405  | 0.456  | 0.507  | 0    |
| 10   | 0.507  | 0.558  | 0.609  | 0.660  | 0.711  | 0.762  | 0.813  | 0.865  | 0.916  | 0.968  | 1.019  | 10   |
| 20   | 1.019  | 1.071  | 1.122  | 1.174  | 1.226  | 1.277  | 1.329  | 1.381  | 1.433  | 1.485  | 1.537  | 20   |
| 30   | 1.537  | 1.589  | 1.641  | 1.693  | 1.745  | 1.797  | 1.849  | 1.902  | 1.954  | 2.006  | 2.059  | 30   |
| 40   | 2.059  | 2.111  | 2.164  | 2.216  | 2.269  | 2.322  | 2.374  | 2.427  | 2.480  | 2.532  | 2.585  | 40   |
| 50   | 2.585  | 2.638  | 2.691  | 2.744  | 2.797  | 2.850  | 2.903  | 2.956  | 3.009  | 3.062  | 3.116  | 50   |
| 60   | 3.116  | 3.169  | 3.222  | 3.275  | 3.328  | 3.382  | 3.436  | 3.489  | 3.543  | 3.596  | 3.650  | 60   |
| 70   | 3.650  | 3.703  | 3.757  | 3.810  | 3.864  | 3.918  | 3.971  | 4.025  | 4.079  | 4.133  | 4.187  | 70   |
| 80   | 4.187  | 4.240  | 4.294  | 4.348  | 4.402  | 4.456  | 4.510  | 4.564  | 4.618  | 4.672  | 4.726  | 80   |
| 90   | 4.726  | 4.781  | 4.835  | 4.889  | 4.943  | 4.997  | 5.052  | 5.106  | 5.160  | 5.215  | 5.269  | 90   |
| 100  | 5.269  | 5.323  | 5.378  | 5.432  | 5.487  | 5.541  | 5.595  | 5.650  | 5.705  | 5.759  | 5.814  | 100  |
| 110  | 5.814  | 5.868  | 5.923  | 5.977  | 6.032  | 6.087  | 6.141  | 6.196  | 6.251  | 6.306  | 6.360  | 110  |
| 120  | 6.360  | 6.415  | 6.470  | 6.525  | 6.579  | 6.634  | 6.689  | 6.744  | 6.799  | 6.854  | 6.909  | 120  |
| 130  | 6.909  | 6.964  | 7.019  | 7.074  | 7.129  | 7.184  | 7.239  | 7.294  | 7.349  | 7.404  | 7.459  | 130  |
| 140  | 7.459  | 7.514  | 7.569  | 7.624  | 7.679  | 7.734  | 7.789  | 7.844  | 7.900  | 7.955  | 8.010  | 140  |
| 150  | 8.010  | 8.065  | 8.120  | 8.175  | 8.231  | 8.286  | 8.341  | 8.396  | 8.452  | 8.507  | 8.562  | 150  |
| 160  | 8.562  | 8.618  | 8.673  | 8.728  | 8.783  | 8.839  | 8.894  | 8.949  | 9.005  | 9.060  | 9.115  | 160  |
| 170  | 9.115  | 9.171  | 9.226  | 9.282  | 9.337  | 9.392  | 9.448  | 9.503  | 9.559  | 9.614  | 9.669  | 170  |
| 180  | 9.669  | 9.725  | 9.780  | 9.836  | 9.891  | 9.947  | 10.002 | 10.057 | 10.113 | 10.168 | 10.224 | 180  |
| 190  | 10.224 | 10.279 | 10.335 | 10.390 | 10.446 | 10.501 | 10.557 | 10.612 | 10.668 | 10.723 | 10.779 | 190  |
| 200  | 10.779 | 10.834 | 10.890 | 10.945 | 11.001 | 11.056 | 11.112 | 11.167 | 11.223 | 11.278 | 11.334 | 200  |
| 210  | 11.334 | 11.389 | 11.445 | 11.501 | 11.556 | 11.612 | 11.667 | 11.723 | 11.778 | 11.834 | 11.889 | 210  |
| 220  | 11.889 | 11.945 | 12.000 | 12.056 | 12.112 | 12.167 | 12.223 | 12.278 | 12.334 | 12.389 | 12.445 | 220  |
| 230  | 12.445 | 12.501 | 12.556 | 12.612 | 12.667 | 12.723 | 12.778 | 12.834 | 12.889 | 12.944 | 13.000 | 230  |
| 240  | 13.000 | 13.056 | 13.111 | 13.167 | 13.222 | 13.278 | 13.333 | 13.389 | 13.444 | 13.500 | 13.555 | 240  |
| 250  | 13.555 | 13.611 | 13.666 | 13.722 | 13.777 | 13.833 | 13.888 | 13.944 | 13.999 | 14.055 | 14.110 | 250  |
| 260  | 14.110 | 14.166 | 14.221 | 14.277 | 14.332 | 14.388 | 14.443 | 14.499 | 14.554 | 14.609 | 14.665 | 260  |
| 270  | 14.665 | 14.720 | 14.776 | 14.831 | 14.887 | 14.942 | 14.998 | 15.053 | 15.109 | 15.164 | 15.219 | 270  |
| 280  | 15.219 | 15.275 | 15.330 | 15.386 | 15.441 | 15.496 | 15.552 | 15.607 | 15.663 | 15.718 | 15.773 | 280  |
| 290  | 15.773 | 15.829 | 15.884 | 15.940 | 15.995 | 16.050 | 16.106 | 16.161 | 16.216 | 16.272 | 16.327 | 290  |
| 300  | 16.327 | 16.383 | 16.438 | 16.493 | 16.549 | 16.604 | 16.659 | 16.715 | 16.770 | 16.825 | 16.881 | 300  |
| 310  | 16.881 | 16.936 | 16.991 | 17.046 | 17.102 | 17.157 | 17.212 | 17.268 | 17.323 | 17.378 | 17.434 | 310  |
| 320  | 17.434 | 17.489 | 17.544 | 17.599 | 17.655 | 17.710 | 17.765 | 17.820 | 17.876 | 17.931 | 17.986 | 320  |
| 330  | 17.986 | 18.041 | 18.097 | 18.152 | 18.207 | 18.262 | 18.318 | 18.373 | 18.428 | 18.483 | 18.538 | 330  |
| 340  | 18.538 | 18.594 | 18.649 | 18.704 | 18.759 | 18.814 | 18.870 | 18.925 | 18.980 | 19.035 | 19.090 | 340  |
| 350  | 19.090 | 19.146 | 19.201 | 19.256 | 19.311 | 19.366 | 19.422 | 19.477 | 19.532 | 19.587 | 19.642 | 350  |
| 360  | 19.642 | 19.697 | 19.753 | 19.808 | 19.863 | 19.918 | 19.973 | 20.028 | 20.083 | 20.139 | 20.194 | 360  |
| 370  | 20.194 | 20.249 | 20.304 | 20.359 | 20.414 | 20.469 | 20.525 | 20.580 | 20.635 | 20.690 | 20.745 | 370  |
| 380  | 20.745 | 20.800 | 20.855 | 20.911 | 20.966 | 21.021 | 21.076 | 21.131 | 21.186 | 21.241 | 21.297 | 380  |
| 390  | 21.297 | 21.352 | 21.407 | 21.462 | 21.517 | 21.572 | 21.627 | 21.683 | 21.738 | 21.793 | 21.848 | 390  |
| 400  | 21.848 | 21.903 | 21.958 | 22.014 | 22.069 | 22.124 | 22.179 | 22.234 | 22.289 | 22.345 | 22.400 | 400  |
| 410  | 22.400 | 22.455 | 22.510 | 22.565 | 22.620 | 22.675 | 22.731 | 22.786 | 22.841 | 22.896 | 22.952 | 410  |
| 420  | 22.952 | 23.007 | 23.062 | 23.117 | 23.172 | 23.228 | 23.283 | 23.338 | 23.393 | 23.449 | 23.504 | 420  |
| 430  | 23.504 | 23.559 | 23.614 | 23.670 | 23.725 | 23.780 | 23.835 | 23.891 | 23.946 | 24.001 | 24.057 | 430  |
| 440  | 24.057 | 24.112 | 24.167 | 24.223 | 24.278 | 24.333 | 24.389 | 24.444 | 24.499 | 24.555 | 24.610 | 440  |
| 450  | 24.610 | 24.665 | 24.721 | 24.776 | 24.832 | 24.887 | 24.943 | 24.998 | 25.053 | 25.109 | 25.164 | 450  |
| 460  | 25.164 | 25.220 | 25.275 | 25.331 | 25.386 | 25.442 | 25.497 | 25.553 | 25.608 | 25.664 | 25.720 | 460  |
| 470  | 25.720 | 25.775 | 25.831 | 25.886 | 25.942 | 25.998 | 26.053 | 26.109 | 26.165 | 26.220 | 26.276 | 470  |
| 480  | 26.276 | 26.332 | 26.387 | 26.443 | 26.499 | 26.555 | 26.610 | 26.666 | 26.722 | 26.778 | 26.834 | 480  |
| 490  | 26.834 | 26.889 | 26.945 | 27.001 | 27.057 | 27.113 | 27.169 | 27.225 | 27.281 | 27.337 | 27.393 | 490  |
| °C   | 0      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | °C   |