

Special Alloy Wire for Heating, Corrosion Resistance or Strength Applications - SS304

$$\text{in}^2/\Omega = \frac{I^2 C_t}{p}$$

I = Current
C_t = Temperature factor
p = Surface load W/in²

Common Names: Stainless Steel 304, SS304

Uses: Used for everything from resistors, heating applications, mechanical components, and springs. Type 304 is the most widely used Chromium-Nickel austenitic stainless steel. It is nonmagnetic in the annealed condition and becomes slightly magnetic when cold worked. It has excellent fabrication and weldability characteristics. Non-hardenable by heat-treating. Low carbon content minimizes problem of carbide precipitation during welding and has permitted this alloy's use in corrosive service in the as-welded condition.

Composition

| Ni | Cr | Fe | Al | Si | Mn | Cu | C | Ti | Mo | W |
|---------|----------|---------|------------|---------|---------|------------|------------|------------|------------|------------|
| 8 - 12% | 18 - 20% | Balance | None/Trace | 1% Max. | 2% Max. | None/Trace | None/Trace | None/Trace | None/Trace | None/Trace |

Technical Data

| | | | |
|----------------------------------|-----------------------------|--|----------------------|
| Resistivity (Ω/cm ²) | 433 | Resistivity (Ω/sqmf) | 329 |
| Resistivity (μΩ/cm) | 70 | Nom. Temp. Coeff. of Resistance (TCR) | 0.000850 |
| Std. Res. Tol. <.020" | 5% | Std. Res. Tol. >.020" | 3% |
| Thermal EMF vs. Cu | -0.022 | Specific Heat (20°C) | 0.118 cal/g |
| Density (g/cm ³) | 7.93 | Density (lb/in ³) | 0.286 |
| Thermal Conductivity | 1.903 W/cm ² /°C | Coeff. of Linear Expansion (X 10 ⁻⁶) | 9.60 in/in/°C |
| Approx. Melting Point | 1399°C | Max. Continuous Operating Temp. | 600°C |
| UTS – Hard (KPSI) | 300 | YTS Tensile – Hard (KPSI) | 280 |
| UTS – Stress Relieved (KPSI) | 280 | YTS Tensile – Stress Relieved (KPSI) | 260 |
| UTS – Annealed (KPSI) | 105 | YTS Tensile – Annealed (KPSI) | 45 |
| Magnetic Attraction | None (Annealed) | Emissivity – fully oxidized | |
| Designations/Specifications | ASTM = A580 | Forms Available | Wire, Ribbon, Square |

Alloy Data

| Gage AWG | Diameter Inch | Resistance at 68° F Ω/ft | Resistance at 68° F Ω/lb | Weight lb/1000 ft | Surface area in ² /ft | in ² /Ω at 68°F |
|----------|---------------|--------------------------|--------------------------|-------------------|----------------------------------|----------------------------|
| 000 | 0.4096 | 0.0025 | 0.0055 | 452.3220 | 15.4432 | 6170.1771 |
| 00 | 0.3648 | 0.0032 | 0.0088 | 358.7071 | 13.7525 | 4357.4869 |
| 0 | 0.3249 | 0.0040 | 0.0140 | 284.4673 | 12.2470 | 3077.3335 |
| 1 | 0.2893 | 0.0050 | 0.0222 | 225.5925 | 10.9062 | 2173.2667 |
| 2 | 0.2576 | 0.0063 | 0.0354 | 178.9027 | 9.7123 | 1534.7989 |
| 3 | 0.2294 | 0.0080 | 0.0562 | 141.8761 | 8.6490 | 1083.9018 |
| 4 | 0.2043 | 0.0101 | 0.0894 | 112.5127 | 7.7022 | 765.4704 |
| 5 | 0.1819 | 0.0127 | 0.1422 | 89.2265 | 6.8590 | 540.5886 |
| 6 | 0.1620 | 0.0160 | 0.2261 | 70.7597 | 6.1081 | 381.7731 |
| 7 | 0.1443 | 0.0202 | 0.3595 | 56.1149 | 5.4394 | 269.6149 |
| 8 | 0.1285 | 0.0254 | 0.5717 | 44.5011 | 4.8439 | 190.4067 |
| 9 | 0.1144 | 0.0321 | 0.9090 | 35.2909 | 4.3136 | 134.4686 |
| 10 | 0.1019 | 0.0405 | 1.4454 | 27.9869 | 3.8414 | 94.9640 |
| 11 | 0.0907 | 0.0510 | 2.2982 | 22.1946 | 3.4209 | 67.0653 |
| 12 | 0.0808 | 0.0643 | 3.6543 | 17.6011 | 3.0464 | 47.3627 |
| 13 | 0.0720 | 0.0811 | 5.8106 | 13.9583 | 2.7129 | 33.4483 |
| 13.5 | 0.0679 | 0.0911 | 7.3271 | 12.4302 | 2.5601 | 28.1089 |
| 14 | 0.0641 | 0.1023 | 9.2393 | 11.0694 | 2.4159 | 23.6218 |
| 14.5 | 0.0605 | 0.1148 | 11.6505 | 9.8576 | 2.2798 | 19.8510 |
| 15 | 0.0571 | 0.1290 | 14.6910 | 8.7784 | 2.1514 | 16.6821 |
| 15.5 | 0.0539 | 0.1448 | 18.5251 | 7.8174 | 2.0302 | 14.0191 |
| 16 | 0.0508 | 0.1626 | 23.3597 | 6.9616 | 1.9159 | 11.7812 |
| 16.5 | 0.0480 | 0.1826 | 29.4561 | 6.1995 | 1.8080 | 9.9005 |

| Gage AWG | Diameter Inch | Resistance at 68° F Ω/ft | Resistance at 68° F Ω/lb | Weight Lb/1000 ft | Surface area in ² /ft | in ² /Ω at 68°F |
|----------|---------------|--------------------------|--------------------------|-------------------|----------------------------------|----------------------------|
| 17 | 0.0453 | 0.2051 | 37.1435 | 5.5208 | 1.7061 | 8.3201 |
| 17.5 | 0.0427 | 0.2303 | 46.8372 | 4.9164 | 1.6100 | 6.9919 |
| 18 | 0.0403 | 0.2586 | 59.0607 | 4.3782 | 1.5194 | 5.8758 |
| 18.5 | 0.0380 | 0.2904 | 74.4743 | 3.8989 | 1.4338 | 4.9378 |
| 19 | 0.0359 | 0.3261 | 93.9105 | 3.4721 | 1.3530 | 4.1496 |
| 19.5 | 0.0339 | 0.3661 | 118.4191 | 3.0919 | 1.2768 | 3.4872 |
| 20 | 0.0320 | 0.4112 | 149.3239 | 2.7535 | 1.2049 | 2.9305 |
| 20.5 | 0.0302 | 0.4617 | 188.2943 | 2.4520 | 1.1370 | 2.4627 |
| 21 | 0.0285 | 0.5185 | 237.4350 | 2.1836 | 1.0730 | 2.0696 |
| 21.5 | 0.0269 | 0.5822 | 299.4005 | 1.9445 | 1.0126 | 1.7392 |
| 22 | 0.0253 | 0.6538 | 377.5376 | 1.7317 | 0.9555 | 1.4616 |
| 22.5 | 0.0239 | 0.7341 | 476.0668 | 1.5421 | 0.9017 | 1.2283 |
| 23 | 0.0226 | 0.8244 | 600.3100 | 1.3733 | 0.8509 | 1.0322 |
| 23.5 | 0.0213 | 0.9257 | 756.9780 | 1.2229 | 0.8030 | 0.8674 |
| 24 | 0.0201 | 1.0395 | 954.5329 | 1.0890 | 0.7578 | 0.7289 |
| 24.5 | 0.0190 | 1.1673 | 1203.6455 | 0.9698 | 0.7151 | 0.6126 |
| 25 | 0.0179 | 1.3108 | 1517.7712 | 0.8637 | 0.6748 | 0.5148 |
| 25.5 | 0.0169 | 1.4720 | 1913.8769 | 0.7691 | 0.6368 | 0.4326 |
| 26 | 0.0159 | 1.6529 | 2413.3576 | 0.6849 | 0.6009 | 0.3636 |
| 26.5 | 0.0150 | 1.8561 | 3043.1921 | 0.6099 | 0.5671 | 0.3055 |
| 27 | 0.0142 | 2.0843 | 3837.3999 | 0.5432 | 0.5351 | 0.2568 |
| 27.5 | 0.0134 | 2.3405 | 4838.8788 | 0.4837 | 0.5050 | 0.2158 |
| 28 | 0.0126 | 2.6283 | 6101.7223 | 0.4307 | 0.4766 | 0.1813 |
| 29 | 0.0113 | 3.3142 | 9702.1462 | 0.3416 | 0.4244 | 0.1281 |
| 30 | 0.0100 | 4.1791 | 15427.0610 | 0.2709 | 0.3779 | 0.0904 |
| 31 | 0.0089 | 5.2698 | 24530.0580 | 0.2148 | 0.3366 | 0.0639 |
| 32 | 0.0080 | 6.6451 | 39004.4316 | 0.1704 | 0.2997 | 0.0451 |
| 33 | 0.0071 | 8.3793 | 62019.6531 | 0.1351 | 0.2669 | 0.0319 |
| 34 | 0.0063 | 10.5661 | 98615.3935 | 0.1071 | 0.2377 | 0.0225 |
| 35 | 0.0056 | 13.3237 | 156805.0666 | 0.0850 | 0.2117 | 0.0159 |
| 36 | 0.0050 | 16.8008 | 249330.5358 | 0.0674 | 0.1885 | 0.0112 |
| 37 | 0.0045 | 21.1855 | 396452.2156 | 0.0534 | 0.1679 | 0.0079 |
| 38 | 0.0040 | 26.7145 | 630385.5194 | 0.0424 | 0.1495 | 0.0056 |
| 39 | 0.0035 | 33.6864 | 1002355.1072 | 0.0336 | 0.1331 | 0.0040 |
| 40 | 0.0031 | 42.4778 | 1593811.6120 | 0.0267 | 0.1185 | 0.0028 |
| 41 | 0.0028 | 53.5636 | 2534266.9842 | 0.0211 | 0.1056 | 0.0020 |
| 42 | 0.0025 | 67.5425 | 4029653.8806 | 0.0168 | 0.0940 | 0.0014 |
| 43 | 0.0022 | 85.1696 | 6407418.9887 | 0.0133 | 0.0837 | 0.0010 |
| 44 | 0.0020 | 107.3971 | 10188224.4267 | 0.0105 | 0.0746 | 0.0007 |
| 45 | 0.0018 | 135.4254 | 16199957.7600 | 0.0084 | 0.0664 | 0.0005 |
| 46 | 0.0016 | 170.7685 | 25759015.5493 | 0.0066 | 0.0591 | 0.0003 |
| 47 | 0.0014 | 215.3355 | 40958556.3060 | 0.0053 | 0.0526 | 0.0002 |
| 48 | 0.0012 | 271.5334 | 65126841.9580 | 0.0042 | 0.0469 | 0.0002 |
| 49 | 0.0011 | 342.3978 | 103556031.4122 | 0.0033 | 0.0418 | 0.0001 |
| 50 | 0.0010 | 431.7562 | 164661011.0277 | 0.0026 | 0.0372 | 0.0001 |

Information presentation property of Hyndman Industrial Products, Inc., 3508 Independence Drive, Fort Wayne, IN 46808-4518, 888.496.3626, www.resistancewire.com

(Disclaimer) This information is provided for information purposes only "As is." Hyndman Industrial Products, Inc. makes no warranty of any kind with respect to the subject matter or accuracy of the information. Hyndman Industrial Products, Inc. specifically disclaims all warranties, expressed, implied or otherwise, including without limitation, all warranties of merchantability and fitness for a particular purpose. This publication may include technical inaccuracies or typographical errors; changes may be made to the information herein. If errors are found, please submit the correction via e-mail to: webmaster@resistancewire.com. Include correction, and page address if possible. All trademarks referenced are the property of their respective owners. Ownership can be researched at www.uspto.gov or by contacting Hyndman Industrial Products, Inc.