# Haynes HastelloyÂ® C-22Â® alloy, all-weld metal, GMAW short arc

**Category :** Metal , Nonferrous Metal , Nickel Alloy , Superalloy

**Material Notes:**

HASTELLOYÂ® C-22Â® alloy is a nickel-chromium-molybdenum-tungsten alloy with excellent overall corrosion resistance compared to other Ni-Cr-Mo alloys, including HASTELLOY C-276 and C-4 alloys and alloy 625. C-22 alloy has outstanding resistance to pitting, crevice corrosion, and stress corrosion cracking. It has excellent resistance to oxidizing aqueous media including wet chlorine and mixtures containing nitric acid or oxidizing acids with chloride ions. C-22 alloy offers optimum resistance to environments where reducing and oxidizing conditions are encountered in process streams. Because of such versatility it can be used where â€œupsetâ€ conditions are likely to occur or in multi-purpose plants. C-22 alloy has exceptional resistance to a wide variety of chemical process environments, including strong oxidizers such as ferric and cupric chlorides, chlorine, hot contaminated solutions (organic and inorganic), formic and acetic acids, acetic anhydride, and seawater and brine solutions. C-22 alloy resists the formation of grain-boundary precipitates in the weld heat-affected zone, thus making it suitable for most chemical process applications in the as-welded condition. Product Forms: C-22 alloy is available in most common product forms: plate, sheet, strip, billet, bar, wire, covered electrodes, pipe, and tubing.Applications: Acetic Acid/Acetic Anhydride Acid Etching Cellophane Manufacturing Chlorination Systems Complex Acid Mixtures Electro-Galvanizing Rolls Expansion Bellows Flue Gas Scrubber Systems Geothermal Wells HF Furnace Scrubbers Incineration Scrubber Systems Nuclear Fuel Reprocessing Pesticide Production Phosphoric Acid Production Pickling Systems Plate Heat Exchangers Selective Leaching Systems SO2 Cooling Towers Sulfonation Systems Tubular Heat Exchangers Weld Overlay-Valves Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:
http://www.lookpolymers.com/polymer_Haynes-Hastelloy-C-22-alloy-all-weld-metal-GMAW-short-arc.php

| Physical Properties | Metric | English | Comments |
|---|---|---|---|
| Density | 8.69 g/cc | 0.314 lb/inÂ³ | |

| Mechanical Properties | Metric | English | Comments |
|---|---|---|---|
| Hardness, Rockwell B | 93<br>@Temperature 23.0 Â°C | 93<br>@Temperature 73.4 Â°F | |
| | 95<br>@Temperature 23.0 Â°C | 95<br>@Temperature 73.4 Â°F | |
| Tensile Strength, Ultimate | 779 MPa | 113000 psi | |
| | 579 MPa<br>@Temperature 538 Â°C | 84000 psi<br>@Temperature 1000 Â°F | |
| | 648 MPa<br>@Temperature 260 Â°C | 94000 psi<br>@Temperature 500 Â°F | |

| Mechanical Properties | Metric | English | Comments |
|---|---|---|---|
| Tensile Strength, Yield | 496 MPa | 71900 psi | |
| | @Strain 0.200 % | @Strain 0.200 % | |
| | 372 MPa<br>@Strain 0.200 %, Temperature 538 Â°C | 54000 psi<br>@Strain 0.200 %, Temperature 1000 Â°F | |
| | 414 MPa<br>@Strain 0.200 %, Temperature 260 Â°C | 60000 psi<br>@Strain 0.200 %, Temperature 500 Â°F | |
| Elongation at Break | 52 % | 52 % | in 50.8 mm |
| | 52 %<br>@Temperature 260 Â°C | 52 %<br>@Temperature 500 Â°F | in 50.8 mm |
| | 55 %<br>@Temperature 538 Â°C | 55 %<br>@Temperature 1000 Â°F | in 50.8 mm |
| Modulus of Elasticity | 206 GPa | 29900 ksi | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 145 GPa<br>@Temperature 982 Â°C | 21000 ksi<br>@Temperature 1800 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 154 GPa<br>@Temperature 871 Â°C | 22300 ksi<br>@Temperature 1600 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 163 GPa<br>@Temperature 760 Â°C | 23600 ksi<br>@Temperature 1400 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 171 GPa<br>@Temperature 649 Â°C | 24800 ksi<br>@Temperature 1200 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 177 GPa<br>@Temperature 538 Â°C | 25700 ksi<br>@Temperature 1000 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 183 GPa<br>@Temperature 427 Â°C | 26500 ksi<br>@Temperature 801 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 190 GPa<br>@Temperature 316 Â°C | 27600 ksi<br>@Temperature 601 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |
| | 196 GPa | 28400 ksi | heat-treated at 1121Â°C (2050Â°F), |

| Mechanical Properties | Metric | English | Comments |
|---|---|---|---|
| | @Temperature 204 Â°C | @Temperature 399 Â°F | rapid quenched, plate |
| | 203 GPa<br>@Temperature 93.0 Â°C | 29400 ksi<br>@Temperature 199 Â°F | heat-treated at 1121Â°C (2050Â°F), rapid quenched, plate |

| Thermal Properties | Metric | English | Comments |
|---|---|---|---|
| CTE, linear | 12.4 Âµm/m-Â°C<br>@Temperature 24.0 - 93.0 Â°C | 6.89 Âµin/in-Â°F<br>@Temperature 75.2 - 199 Â°F | |
| | 12.4 Âµm/m-Â°C<br>@Temperature 24.0 - 204 Â°C | 6.89 Âµin/in-Â°F<br>@Temperature 75.2 - 399 Â°F | |
| | 12.6 Âµm/m-Â°C<br>@Temperature 24.0 - 316 Â°C | 7.00 Âµin/in-Â°F<br>@Temperature 75.2 - 601 Â°F | |
| | 13.3 Âµm/m-Â°C<br>@Temperature 24.0 - 427 Â°C | 7.39 Âµin/in-Â°F<br>@Temperature 75.2 - 801 Â°F | |
| | 13.9 Âµm/m-Â°C<br>@Temperature 24.0 - 538 Â°C | 7.72 Âµin/in-Â°F<br>@Temperature 75.2 - 1000 Â°F | |
| | 14.6 Âµm/m-Â°C<br>@Temperature 24.0 - 649 Â°C | 8.11 Âµin/in-Â°F<br>@Temperature 75.2 - 1200 Â°F | |
| | 15.3 Âµm/m-Â°C<br>@Temperature 24.0 - 760 Â°C | 8.50 Âµin/in-Â°F<br>@Temperature 75.2 - 1400 Â°F | |
| | 15.8 Âµm/m-Â°C<br>@Temperature 24.0 - 871 Â°C | 8.78 Âµin/in-Â°F<br>@Temperature 75.2 - 1600 Â°F | |
| | 16.2 Âµm/m-Â°C<br>@Temperature 24.0 - 982 Â°C | 9.00 Âµin/in-Â°F<br>@Temperature 75.2 - 1800 Â°F | |
| Specific Heat Capacity | 0.414 J/g-Â°C<br>@Temperature 52.0 Â°C | 0.0989 BTU/lb-Â°F<br>@Temperature 126 Â°F | |
| | 0.423 J/g-Â°C | 0.101 BTU/lb-Â°F | |

| Thermal Properties | Metric | English | Comments |
|---|---|---|---|
| | @Temperature 100 Â°C | @Temperature 212 Â°F | |
| | 0.444 J/g-Â°C<br>@Temperature 200 Â°C | 0.106 BTU/lb-Â°F<br>@Temperature 392 Â°F | |
| | 0.460 J/g-Â°C<br>@Temperature 300 Â°C | 0.110 BTU/lb-Â°F<br>@Temperature 572 Â°F | |
| | 0.476 J/g-Â°C<br>@Temperature 400 Â°C | 0.114 BTU/lb-Â°F<br>@Temperature 752 Â°F | |
| | 0.489 J/g-Â°C<br>@Temperature 500 Â°C | 0.117 BTU/lb-Â°F<br>@Temperature 932 Â°F | |
| | 0.514 J/g-Â°C<br>@Temperature 600 Â°C | 0.123 BTU/lb-Â°F<br>@Temperature 1110 Â°F | |
| Thermal Conductivity | 10.1 W/m-K<br>@Temperature 48.0 Â°C | 70.1 BTU-in/hr-ftÂ²-Â°F<br>@Temperature 118 Â°F | |
| | 11.1 W/m-K<br>@Temperature 100 Â°C | 77.0 BTU-in/hr-ftÂ²-Â°F<br>@Temperature 212 Â°F | |
| | 13.4 W/m-K<br>@Temperature 200 Â°C | 93.0 BTU-in/hr-ftÂ²-Â°F<br>@Temperature 392 Â°F | |
| | 15.5 W/m-K<br>@Temperature 300 Â°C | 108 BTU-in/hr-ftÂ²-Â°F<br>@Temperature 572 Â°F | |
| | 17.5 W/m-K<br>@Temperature 400 Â°C | 121 BTU-in/hr-ftÂ²-Â°F<br>@Temperature 752 Â°F | |
| | 19.5 W/m-K<br>@Temperature 500 Â°C | 135 BTU-in/hr-ftÂ²-Â°F<br>@Temperature 932 Â°F | |
| | 21.3 W/m-K<br>@Temperature 600 Â°C | 148 BTU-in/hr-ftÂ²-Â°F<br>@Temperature 1110 Â°F | |
| Melting Point | 1357 - 1399 Â°C | 2475 - 2550 Â°F | |
| Solidus | 1357 Â°C | 2475 Â°F | |
| Liquidus | 1399 Â°C | 2550 Â°F | |

| Component Elements Properties | Metric | English | Comments |
|---|---|---|---|
| Carbon, C | <= 0.010 % | <= 0.010 % | |
| Chromium, Cr | 22 % | 22 % | |
| Cobalt, Co | <= 2.5 % | <= 2.5 % | |
| Iron, Fe | 3.0 % | 3.0 % | |
| Manganese, Mn | <= 0.50 % | <= 0.50 % | |
| Molybdenum, Mo | 13 % | 13 % | |
| Nickel, Ni | 56 % | 56 % | |
| Silicon, Si | <= 0.080 % | <= 0.080 % | |
| Tungsten, W | 3.0 % | 3.0 % | |
| Vanadium, V | <= 0.35 % | <= 0.35 % | |

| Electrical Properties | Metric | English | Comments |
|---|---|---|---|
| Electrical Resistivity | 0.000114 ohm-cm<br>@Temperature 24.0 Â°C | 0.000114 ohm-cm<br>@Temperature 75.2 Â°F | |
| | 0.000123 ohm-cm<br>@Temperature 100 Â°C | 0.000123 ohm-cm<br>@Temperature 212 Â°F | |
| | 0.000124 ohm-cm<br>@Temperature 200 Â°C | 0.000124 ohm-cm<br>@Temperature 392 Â°F | |
| | 0.000125 ohm-cm<br>@Temperature 300 Â°C | 0.000125 ohm-cm<br>@Temperature 572 Â°F | |
| | 0.000126 ohm-cm<br>@Temperature 400 Â°C | 0.000126 ohm-cm<br>@Temperature 752 Â°F | |
| | 0.000127 ohm-cm<br>@Temperature 500 Â°C | 0.000127 ohm-cm<br>@Temperature 932 Â°F | |
| | 0.000128 ohm-cm<br>@Temperature 600 Â°C | 0.000128 ohm-cm<br>@Temperature 1110 Â°F | |

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