

## Haynes Ultimet® alloy, 12.7 mm (1/2 in.) thick plate, SMAW weld

Category : Metal , Nonferrous Metal , Cobalt Alloy , Superalloy

### Material Notes:

Co content as balance, excellent corrosion resistance, outstanding wear resistance, high tensile strength combined with excellent impact toughness and ductility. Ideal welding material with exceptional ductility and resistance to weld cracking, very easy to apply as an overlay, multiple layers applicable with little to no preheat. Applications include agitators, blenders, bolts, dies, extruders, fan blades, filters, glass plungers, nozzles, pumps, rolls, screw conveyors, and valve parts. Data provided by the manufacturer, Haynes International, Inc.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Haynes-Ultimet-alloy-127-mm-12-in-thick-plate-SMAW-weld.php](http://www.lookpolymers.com/polymer_Haynes-Ultimet-alloy-127-mm-12-in-thick-plate-SMAW-weld.php)

| Physical Properties | Metric    | English                  | Comments |
|---------------------|-----------|--------------------------|----------|
| Density             | 8.47 g/cc | 0.306 lb/in <sup>3</sup> |          |

| Mechanical Properties      | Metric                          | English                             | Comments  |
|----------------------------|---------------------------------|-------------------------------------|---|
| Tensile Strength, Ultimate | 931 MPa                         | 135000 psi                          |   |
| Tensile Strength, Yield    | 669 MPa<br>@Strain 0.200 %      | 97000 psi<br>@Strain 0.200 %        |   |
| Elongation at Break        | 9.0 %                           | 9.0 %                               | in 50.8 mm  |
| Modulus of Elasticity      | 180 GPa<br>@Temperature 649 Â°C | 26100 ksi<br>@Temperature 1200 Â°F  | (heat treated at 1121Â°C (2050Â°F), water quenched plate) |
|                            | 189 GPa<br>@Temperature 538 Â°C | 27400 ksi<br>@Temperature 1000 Â°F  | (heat treated at 1121Â°C (2050Â°F), water quenched plate) |
|                            | 197 GPa<br>@Temperature 427 Â°C | 28600 ksi<br>@Temperature 801 Â°F   | (heat treated at 1121Â°C (2050Â°F), water quenched plate) |
|                            | 206 GPa<br>@Temperature 316 Â°C | 29900 ksi<br>@Temperature 601 Â°F   | (heat treated at 1121Â°C (2050Â°F), water quenched plate) |
|                            | 215 GPa<br>@Temperature 204 Â°C | 31200 ksi<br>@Temperature 399 Â°F   | (heat treated at 1121Â°C (2050Â°F), water quenched plate) |
| Charpy Impact              | 127 J<br>@Temperature 23.0 Â°C  | 93.7 ft-lb<br>@Temperature 73.4 Â°F |   |

| Thermal Properties | Metric | English | Comments |
|--------------------|--------|---------|----------|
|--------------------|--------|---------|----------|

| Thermal Properties          | Metric                       | English                      | Comments |
|-----------------------------|------------------------------|------------------------------|----------|
| CTE, linear                 | @Temperature 26.0 - 316 Â°C  | @Temperature 78.8 - 601 Â°F  |          |
|                             | 14.5 Âµm/m-Â°C               | 8.06 Âµin/in-Â°F             |          |
|                             | @Temperature 26.0 - 427 Â°C  | @Temperature 78.8 - 801 Â°F  |          |
|                             | 14.8 Âµm/m-Â°C               | 8.22 Âµin/in-Â°F             |          |
|                             | @Temperature 26.0 - 538 Â°C  | @Temperature 78.8 - 1000 Â°F |          |
|                             | 15.1 Âµm/m-Â°C               | 8.39 Âµin/in-Â°F             |          |
|                             | @Temperature 26.0 - 649 Â°C  | @Temperature 78.8 - 1200 Â°F |          |
|                             | 15.9 Âµm/m-Â°C               | 8.83 Âµin/in-Â°F             |          |
|                             | @Temperature 26.0 - 760 Â°C  | @Temperature 78.8 - 1400 Â°F |          |
|                             | 16.4 Âµm/m-Â°C               | 9.11 Âµin/in-Â°F             |          |
| @Temperature 26.0 - 871 Â°C | @Temperature 78.8 - 1600 Â°F |                              |          |
| 16.9 Âµm/m-Â°C              | 9.39 Âµin/in-Â°F             |                              |          |
| @Temperature 26.0 - 982 Â°C | @Temperature 78.8 - 1800 Â°F |                              |          |
| Specific Heat Capacity      | 0.456 J/g-Â°C                | 0.109 BTU/lb-Â°F             |          |
|                             | @Temperature 23.0 Â°C        | @Temperature 73.4 Â°F        |          |
|                             | 0.470 J/g-Â°C                | 0.112 BTU/lb-Â°F             |          |
|                             | @Temperature 100 Â°C         | @Temperature 212 Â°F         |          |
|                             | 0.482 J/g-Â°C                | 0.115 BTU/lb-Â°F             |          |
|                             | @Temperature 200 Â°C         | @Temperature 392 Â°F         |          |
|                             | 0.504 J/g-Â°C                | 0.120 BTU/lb-Â°F             |          |
|                             | @Temperature 300 Â°C         | @Temperature 572 Â°F         |          |
|                             | 0.525 J/g-Â°C                | 0.125 BTU/lb-Â°F             |          |
| @Temperature 400 Â°C        | @Temperature 752 Â°F         |                              |          |
| 0.545 J/g-Â°C               | 0.130 BTU/lb-Â°F             |                              |          |
| @Temperature 500 Â°C        | @Temperature 932 Â°F         |                              |          |
| 0.573 J/g-Â°C               | 0.137 BTU/lb-Â°F             |                              |          |

| Thermal Properties   | Metric                             | English  | Comments |
|----------------------|------------------------------------|--|----------|
| Thermal Conductivity | 12.3 W/m-K<br>@Temperature 600 Å°C | 85.4 BTU-in/hr-ftÅ²-Å°F<br>@Temperature 1110 Å°F |          |
|                      | @Temperature 23.0 Å°C              | @Temperature 73.4 Å°F                            |          |
|                      | 13.8 W/m-K<br>@Temperature 100 Å°C | 95.8 BTU-in/hr-ftÅ²-Å°F<br>@Temperature 212 Å°F  |          |
|                      | 15.6 W/m-K<br>@Temperature 200 Å°C | 108 BTU-in/hr-ftÅ²-Å°F<br>@Temperature 392 Å°F   |          |
|                      | 17.5 W/m-K<br>@Temperature 300 Å°C | 121 BTU-in/hr-ftÅ²-Å°F<br>@Temperature 572 Å°F   |          |
|                      | 19.4 W/m-K<br>@Temperature 400 Å°C | 135 BTU-in/hr-ftÅ²-Å°F<br>@Temperature 752 Å°F   |          |
|                      | 21.5 W/m-K<br>@Temperature 500 Å°C | 149 BTU-in/hr-ftÅ²-Å°F<br>@Temperature 932 Å°F   |          |
|                      | 23.9 W/m-K<br>@Temperature 600 Å°C | 166 BTU-in/hr-ftÅ²-Å°F<br>@Temperature 1110 Å°F  |          |
| Melting Point        | 1332 - 1354 Å°C                    | 2430 - 2469 Å°F                                  |          |
| Solidus              | 1332 Å°C                           | 2430 Å°F   |          |
| Liquidus             | 1354 Å°C                           | 2469 Å°F   |          |

| Component Elements Properties | Metric  | English | Comments |
|-------------------------------|---------|---------|----------|
| Carbon, C                     | 0.060 % | 0.060 % |          |
| Chromium, Cr                  | 26 %    | 26 %    |          |
| Cobalt, Co                    | 54 %    | 54 %    |          |
| Iron, Fe                      | 3.0 %   | 3.0 %   |          |
| Manganese, Mn                 | 0.80 %  | 0.80 %  |          |
| Molybdenum, Mo                | 5.0 %   | 5.0 %   |          |
| Nickel, Ni                    | 9.0 %   | 9.0 %   |          |
| Nitrogen, N                   | 0.080 % | 0.080 % |          |

| Component Elements Properties | 0.30 %<br>Metric | 0.30 %<br>English | Comments |
|-------------------------------|------------------|-------------------|----------|
| Tungsten, W                   | 2.0 %            | 2.0 %             |          |

| Electrical Properties  | Metric                   | English               | Comments |
|------------------------|--------------------------|-----------------------|----------|
| Electrical Resistivity | 0.0000870 ohm-cm         | 0.0000870 ohm-cm      |          |
|                        | @Temperature 23.0<br>Â°C | @Temperature 73.4 Â°F |          |
|                        | 0.0000890 ohm-cm         | 0.0000890 ohm-cm      |          |
|                        | @Temperature 100 Â°C     | @Temperature 212 Â°F  |          |
|                        | 0.0000930 ohm-cm         | 0.0000930 ohm-cm      |          |
|                        | @Temperature 200 Â°C     | @Temperature 392 Â°F  |          |
|                        | 0.0000960 ohm-cm         | 0.0000960 ohm-cm      |          |
|                        | @Temperature 300 Â°C     | @Temperature 572 Â°F  |          |
| 0.000100 ohm-cm        | 0.000100 ohm-cm          |                       |          |
| @Temperature 400 Â°C   | @Temperature 752 Â°F     |                       |          |
| 0.000103 ohm-cm        | 0.000103 ohm-cm          |                       |          |
| @Temperature 500 Â°C   | @Temperature 932 Â°F     |                       |          |
| 0.000105 ohm-cm        | 0.000105 ohm-cm          |                       |          |
| @Temperature 600 Â°C   | @Temperature 1110<br>Â°F |                       |          |

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