

Alloy 165 (C17000) Cold Rolled (Heat Treatable) Strip

Materion's Alloy 165 strip provides strength and conductivity close to Alloy 25 strip, with slightly less beryllium. Since it is heat treated after forming, it provides excellent formability and ductility. This alloy features good stress relaxation resistance and high fatigue strength. Typical applications include pressure sensor bellows, burn-in and test socket contacts, computer processor socket contacts, and electromagnetic shielding gaskets.

Chemical Composition (Weight Percent)

| Alloy | Beryllium | Nickel + Cobalt | Nickel + Cobalt + Iron | Copper |
|--------|-------------|-----------------|------------------------|---------|
| C17000 | 1.60 - 1.85 | 0.2 min. | 0.6 max. | Balance |

Typical Physical Properties*

| Elastic Modulus | Melting Point (Solidus) | Electrical Conductivity/ Resistivity | Density** | Thermal Expansion Coefficient | Thermal Conductivity (25 °C) |
|-----------------------|-------------------------|--------------------------------------|--|---|-------------------------------|
| 19,000 ksi 131 GPa | 1600°F 870 °C | 22 - 28% IACS 6.2 - 7.8 μΩ-cm | 0.304 lb/in ³ 8.41 g/cm ³ | 9.7 x 10 ⁻⁶ in/in °F 17.0 x 10 ⁻⁶ m/m °C | 60 BTU/ft hr °F 105 W/ m K |

*Properties specified for the overaged precipitation hardened (heat treated) condition.

**Density in the cold-rolled condition (prior to heat treatment) is 0.302 lb/in³ (8.36 g/cm³).

Typical Mechanical Properties*

| Temper** | 0.2% Offset Yield Strength | | Ultimate Tensile Strength | | Elongation*** | Hardness | Formability (Minimum Bend Radius to Thickness Ratio for a 90° Bend)**** | |
|-------------|----------------------------|-------------|---------------------------|-------------|---------------|-----------|---|-----|
| | ksi | MPa | ksi | MPa | | | Percent | DPH |
| A (TB00) | 28 - 55 | 190 - 380 | 60 - 78 | 410 - 540 | 35 - 65 | 90 - 144 | 0.0 | 0.0 |
| ¼ H (TD01) | 60 - 80 | 410 - 560 | 75 - 88 | 520 - 610 | 15 - 45 | 121 - 185 | 0.0 | 0.0 |
| ½ H (TD02) | 75 - 95 | 510 - 660 | 85 - 100 | 580 - 690 | 12 - 30 | 176 - 216 | 0.5 | 1.0 |
| H (TD04) | 90 - 115 | 620 - 800 | 100 - 130 | 680 - 900 | 2 - 18 | 216 - 287 | 1.0 | 2.9 |
| AT (TF00) | 130 - 165 | 890 - 1140 | 150 - 180 | 1030 - 1240 | 3 - 20 | 325 - 373 | - | - |
| ¼ HT (TH01) | 135 - 175 | 930 - 1210 | 160 - 190 | 1100 - 1310 | 3 - 15 | 343 - 393 | - | - |
| ½ HT (TH02) | 145 - 180 | 1000 - 1240 | 170 - 200 | 1170 - 1380 | 1 - 10 | 363 - 413 | - | - |
| HT (TH04) | 155 - 180 | 1070 - 1240 | 180 - 210 | 1240 - 1450 | 1 - 6 | 372 - 435 | - | - |

*Properties may vary by thickness.

**Heat treatment temperature is 600°F (315°C). AT temper requires a 3-hour soak time at temperature while the other tempers require 2 hours.

***Elongation numbers valid only for strip greater than 0.004" (0.10 mm) thick.

****Formability numbers valid for strip 0.010" (0.25 mm) and thinner.

Forms Available

Alloy 165 strip is available in widths ranging from 0.050" to 16" (1.27 mm to 452.7 mm) and in thicknesses ranging from 0.002" to 0.188" (0.05 mm to 4.77 mm). It is also available in rod, bar, plate, tube, and parts finished by forging or extrusion.

Industry Standards and Specifications

C17000, ASTM B194, SAE J461, SAE J463, NACE MRO175/ISO 15156, QQC-533, JIS H3130, EN 1654

Related Information

Additional technical information on Alloy 165 strip may be obtained by calling +1.800.375.4205. For pricing and availability, call +1.800.521.8800.

Tolerances

| Strip Thickness (inches) | | Standard Thickness Tolerance (inches) | Strip Thickness (mm) | | Standard Thickness Tolerance (mm) |
|--------------------------|-----------|---------------------------------------|----------------------|-----------|-----------------------------------|
| Over | Including | Plus or Minus | Over | Including | Plus or Minus |
| | 0.0020 | 0.00010 | | 0.05 | 0.003 |
| 0.0020 | 0.0040 | 0.00015 | 0.05 | 0.10 | 0.004 |
| 0.0040 | 0.0060 | 0.00020 | 0.10 | 0.20 | 0.006 |
| 0.0060 | 0.0090 | 0.00025 | 0.20 | 0.30 | 0.008 |
| 0.0090 | 0.0130 | 0.00030 | 0.30 | 0.70 | 0.010 |
| 0.0130 | 0.0260 | 0.00040 | 0.70 | 1.00 | 0.016 |
| 0.0260 | 0.0370 | 0.00060 | 1.00 | 1.30 | 0.020 |
| 0.0370 | 0.0500 | 0.00080 | 1.30 | 2.00 | 0.025 |
| 0.0500 | 0.0750 | 0.00100 | | | |

Additional tolerances are per ASTM B194. Please specify the exact tolerances that you require when you place your order. Tighter tolerances may be available at additional cost. Please contact your local sales engineer to confirm the requested capability.

Health and Safety

Processing beryllium-containing alloys poses a health risk if safe practices are not followed. Inhalation of airborne beryllium can cause serious lung diseases in some individuals. Occupational safety and health regulatory agencies worldwide have set mandatory limits on occupational respiratory exposures. Read and follow the guidance in the Safety Data Sheet (SDS) before working with this material. The SDS and additional important beryllium health and safety information and guidance can be found at berylliumsafety.com, berylliumsafety.eu and Materion.com. For questions on safe practices for beryllium-containing alloys, contact the Materion Product Stewardship Group at +1.800.862.4118 or contact us by e mail at Materion-PS@Materion.com.

Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.