

## Carpenter Micro-Melt® 10 Hardened and Tempered Tool Steel (AISI A11)

Category : Metal , Ferrous Metal , Tool Steel

### Material Notes:

Micro-Melt® 10 tool steel is a high vanadium tool steel produced using the Carpenter Micro-Melt powder process. This grade possesses wear resistance superior to most other tool steels along with good strength and toughness characteristics. Many of the benefits realized in the use of Micro-Melt powder metals, such as Micro-Melt® 10 alloy, are a direct result of the refined microstructure (smaller, more uniformly distributed carbide particles and a finer grain size) and the lack of segregation in the powder metallurgy product. These advantages include ease of grinding, improved response to heat treatment, greater wear resistance, and increased toughness of the finished tool. Micro-Melt 10 tool steel changes size only slightly after hardening. An expansion of about 0.0004 inches/inch is typical. Applications: punches, dies for blanking, piercing dies, forming rolls and dies, cold heading, steel mill rolls, cold extrusion, slitter knives, shears, pelletizer blades, nozzles, woodworking tools, cold extrusion barrels, cold extrusion liners, plastic injection molds, compacting tools. Information provided by Carpenter Technology Corporation. Micro-Melt® is a registered trademark of Carpenter Technology Corporation.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_Carpenter-Micro-Melt-10-Hardened-and-Tempered-Tool-Steel-AISI-A11.php](http://www.lookpolymers.com/polymer_Carpenter-Micro-Melt-10-Hardened-and-Tempered-Tool-Steel-AISI-A11.php)

| Physical Properties | Metric    | English   | Comments |
|---------------------|-----------|-----------|----------|
| Specific Gravity    | 7.45 g/cc | 7.45 g/cc |          |

| Mechanical Properties | Metric  | English   | Comments                                  |
|-----------------------|---------|-----------|---|
| Hardness, Rockwell C  | 44      | 44        | Tempered at 1200°F Austenitized at 1950°F |
|                       | 64.5    | 64.5      | As quenched, Austenitized at 1950°F       |
| Modulus of Elasticity | 200 GPa | 29000 ksi |   |

| Thermal Properties | Metric                     | English                     | Comments |
|--------------------|----------------------------|-----------------------------|----------|
| CTE, linear        | 10.72 µm/m-°C              | 5.956 µin/in-°F             |          |
|                    | @Temperature 21.0 - 100 °C | @Temperature 69.8 - 212 °F  |          |
|                    | 11.13 µm/m-°C              | 6.183 µin/in-°F             |          |
|                    | @Temperature 21.0 - 260 °C | @Temperature 69.8 - 500 °F  |          |
|                    | 12.32 µm/m-°C              | 6.844 µin/in-°F             |          |
|                    | @Temperature 21.0 - 538 °C | @Temperature 69.8 - 1000 °F |          |

| Component Elements Properties | Metric      | English     | Comments |
|-------------------------------|-------------|-------------|----------|
| Carbon, C                     | 2.4 - 2.5 % | 2.4 - 2.5 % |          |

| <div>Chromium, Cr</div> <div>Component Elements Properties</div> | <div>4.75 - 5.75 %</div> <div>Metric</div> | <div>4.75 - 5.75 %</div> <div>English</div> | Comments   |
|--|--|---|------------|
| Iron, Fe   | 78.21 - 81.35 %                            | 78.21 - 81.35 %                             | As Balance |
| Manganese, Mn  | 0.35 - 0.60 %                              | 0.35 - 0.60 %                               |            |
| Molybdenum, Mo   | 1.1 - 1.5 %                                | 1.1 - 1.5 %                                 |            |
| Silicon, Si  | 0.75 - 1.1 %                               | 0.75 - 1.1 %                                |            |
| Sulfur, S  | 0.050 - 0.090 %                            | 0.050 - 0.090 %                             |            |
| Vanadium, V  | 9.25 - 10.25 %                             | 9.25 - 10.25 %                              |            |

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