# Dura-Bar 100-70-03 Continuously Cast Ductile Iron Bar Stock ASTM A536

**Category :** Metal , Ferrous Metal , Cast Iron , Alloy Cast Iron , Ductile Iron

**Material Notes:**

Continuously cast ductile iron bar stock is produced in a wide variety of sizes and shapes, including rounds, rectangles and special shape cross sections.It often is used as a direct replacement for plain carbon steel and can offer dramatic cost reductions for parts that require a lot of machining. The machinability rating of ductile iron bar stock will be similar to free machining carbon steel grades, such as 12L14, 11L17, 86L20, 1141 and 1144, and achievable machining speeds will be significantly higher.Ductile iron contains graphite in the form of very small, round nodules that give the material free machining properties without the addition of lead, bismuth, sulfur or phosphorus. The continuous casting process eliminates typical foundry defects, such as gas holes, hard spots, slag inclusions and inconsistent properties, that result from different molding methods. Bars are cast through a water-cooled graphite die mounted on the bottom of a large bar machine crucible. The ferrostatic head pressure created by the molten metal in the bar machine crucible forces iron into the die, producing a very fine-grained microstructure. The outer “rim” is the only part of the bar that is solid when it exits the die. The core is molten iron. Heat from the molten iron core reheats the rapidly chilled outer skin, producing a homogenized microstructure that is cooled to room temperature in still air.Ductile iron bar stock consists of a microstructure that is made up of graphite nodules in a solid metal matrix. The solid metal matrix will be similar to the matrix structure in carbon steel bars, and the amount of combined carbon determines the mechanical and physical properties of each grade.The 100-70-02 ductile iron grade's matrix is predominately pearlitic, with only about 5% ferrite in the microstructure. It is the least machinable of the "as-cast" ductile iron grades but has excellent strength and wear resistance. The 100-70-02 grade frequently is used to replace heat-treated medium carbon steel bars in applications that are subjected to sliding wear. The wear resistance will be similar to Rc 30 heat-treated steel.Composition: Typical chemical composition and ranges, actual values depend on cross section size.Information provided by Dura-Bar

Order this product through the following link:
http://www.lookpolymers.com/polymer_Dura-Bar-100-70-03-Continuously-Cast-Ductile-Iron-Bar-Stock-ASTM-A536.php

| Physical Properties | Metric | English | Comments |
|---|---|---|---|
| Density | 6.64 - 7.20 g/cc | 0.240 - 0.260 lb/in³ | Approximately 10% lighter than carbon steel |

| Mechanical Properties | Metric | English | Comments |
|---|---|---|---|
| Hardness, Brinell | 241 - 302 | 241 - 302 | Depends on cast section size and location of test |
| Tensile Strength, Ultimate | 758 MPa | 110000 psi | Typical |
| Tensile Strength, Yield | 586 MPa | 85000 psi | Typical |
| Elongation at Break | 5.0 % | 5.0 % | Typical |
| Reduction of Area | 2.0 % | 2.0 % | |
| Tensile Modulus | 172 GPa | 25000 ksi | Typical |
| Compressive Yield Strength | >= 579 MPa | >= 84000 psi | Compressive yield will be 1.2 times the tensile yield |

| Mechanical Properties | Metric | English | Comments |
|---|---|---|---|
| Poissons Ratio | 0.275 | 0.275 | Generally accepted value |
| Fatigue Strength | 255 MPa<br>@# of Cycles 1.00e+8 | 37000 psi<br>@# of Cycles 1.00e+8 | rotating beam |
| Shear Modulus | 67.6 GPa | 9800 ksi | calculated |
| Shear Strength | 621 MPa | 90000 psi | Shear strength is 90% of tensile strength for all ductile iron grades |
| Charpy Impact | 27.1 J<br>@Temperature 23.0 °C | 20.0 ft-lb<br>@Temperature 73.4 °F | |

| Thermal Properties | Metric | English | Comments |
|---|---|---|---|
| CTE, linear | 10.6 µm/m-°C<br>@Temperature 21.0 - 100 °C | 5.89 µin/in-°F<br>@Temperature 69.8 - 212 °F | Mean |
| | 11.7 µm/m-°C<br>@Temperature 21.0 - 300 °C | 6.50 µin/in-°F<br>@Temperature 69.8 - 572 °F | Mean |
| | 13.3 µm/m-°C<br>@Temperature 21.0 - 500 °C | 7.39 µin/in-°F<br>@Temperature 69.8 - 932 °F | Mean |
| | 13.6 µm/m-°C<br>@Temperature 21.0 - 900 °C | 7.56 µin/in-°F<br>@Temperature 69.8 - 1650 °F | Mean |
| Specific Heat Capacity | 0.506 J/g-°C | 0.121 BTU/lb-°F | |
| Thermal Conductivity | 32.31 W/m-K | 224.2 BTU-in/hr-ft²-°F | |
| Melting Point | 1120 °C | 2050 °F | Eutectic temp |
| Maximum Service Temperature, Air | 649 °C | 1200 °F | |
| Minimum Service Temperature, Air | -30.0 °C | -22.0 °F | |

| Component Elements Properties | Metric | English | Comments |
|---|---|---|---|
| Carbon, C | 3.5 - 3.9 % | 3.5 - 3.9 % | |
| Chromium, Cr | <= 0.050 % | <= 0.050 % | |
| Copper, Cu | 0.10 - 0.50 % | 0.10 - 0.50 % | |
| Iron, Fe | 95 % | 95 % | |

| Component Elements Properties | Metric | English | Comments |
|---|---|---|---|
| Manganese, Mn | 0.15 - 0.35 % | 0.15 - 0.35 % | |
| Phosphorous, P | <= 0.050 % | <= 0.050 % | |
| Silicon, Si | 2.25 - 2.75 % | 2.25 - 2.75 % | |
| Sulfur, S | 0.010 - 0.025 % | 0.010 - 0.025 % | |
| Tin, Sn | 0.070 - 0.25 % | 0.070 - 0.25 % | |

| Electrical Properties | Metric | English | Comments |
|---|---|---|---|
| Volume Resistivity | 0.0000060 ohm-cm | 0.0000060 ohm-cm | At 2.50% Silicon |
| Magnetic Permeability | 250 - 400 | 250 - 400 | 25 Oersteds, High hysteresis loss |

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