Dura-Bar 120-90-02 Continuously Cast Ductile Iron Bar Stock ASTM A536

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

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. It often is used as an alternative to gray iron castings. 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 120-90-02 ductile iron grade must be heat treated and will contain a martensitic matrix. After quench and tempering, the hardness of this grade will range from Rc 20 - Rc 55 depending on the tempering temperature.Composition: Typical chemical composition and ranges, actual values depend on cross section size.Information provided by Dura-Bar

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http://www.lookpolymers.com/polymer_Dura-Bar-120-90-02-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, Rockwell C	30 - 55	30 - 55	
Tensile Strength, Ultimate	>= 827 MPa	>= 120000 psi	Mid-radius
Tensile Strength, Yield	>= 621 MPa @Strain 0.200 %	>= 90000 psi @Strain 0.200 %	
Elongation at Break	>= 2.0 %	>= 2.0 %	
Reduction of Area	2.0 %	2.0 %	
Tensile Modulus	172 GPa	25000 ksi	Typical
Compressive Yield Strength	>= 745 MPa	>= 108000 psi	
Poissons Ratio	0.275	0.275	Generally accepted value

Mechanical Properties	Metric	English	Comments
Shear Modulus	37.6 GPa	5500 ksi	calculated
Shear Strength	745 MPa	108000 psi	Shear strength is 90% of tensile strength for all ductile iron grades

Thermal Properties	Metric	English	Comments
CTE, linear	12.2 µm/m-°C @Temperature 21.0 - 300 °C	6.78 µin/in-°F @Temperature 69.8 - 572 °F	Mean
	13.5 µm/m-°C @Temperature 21.0 - 500 °C	7.50 µin/in-°F @Temperature 69.8 - 932 °F	Mean
	13.7 µm/m-°C @Temperature 21.0 - 900 °C	7.61 µin/in-°F @Temperature 69.8 - 1650 °F	Mean
Specific Heat Capacity	0.460 - 0.602 J/g-°C @Temperature 22.2 - 699 °C	0.110 - 0.144 BTU/lb-°F @Temperature 72.0 - 1290 °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 %	
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	0.010 - 0.050 %	0.010 - 0.050 %	

Electrical Properties	Metric	English	Comments
Volume Resistivity	0.0000060 ohm-cm	0.0000060 ohm-cm	

Contact Songhan Plastic Technology Co.,Ltd.

Website : www.lookpolymers.com
Email : sales@lookpolymers.com
Tel : +86 021-51131842
Mobile : +86 13061808058
Skype : lookpolymers
Address : United North Road 215,Fengxian District, Shanghai City,China