

# 60-40-18 Ductile Iron

## Description

Dura-Bar 60-40-18 is a nodular iron with a fully ferritic matrix. This iron grade's microstructure is achieved through annealing and offers excellent ductility and impact strength. Dura-Bar 60-40-18 has the most ductility out of the ductile iron family of Dura-Bar. Annealed Dura-Bar is NACE compliant and meets ASTM A395 and ASTM A536.

## Applications

### Automotive:

Gears

### Fluid Power:

Cylinder Blocks, End Caps, Gear Rack Housings, Gerotors, Glands, Manifolds, Pistons, Rotors, Valves

### Glass Mold:

Bank Molds, Plungers

### Machinery:

Barrell Rollers, Bushings, Chain Sheave Rollers, Chuck Bodies, Die Blocks, Flywheels, Gear Racks, Gears, Housings, Pile Drivers, Press Rams, Pulleys, Rams, Rotary Tables

### Miscellaneous:

Port Plate

### Power Transmission:

Gears, Pulleys

### Pump and Compressor:

Gears, Housings, Pistons, Rotors

### Steel Mill:

Guide Rolls, Pinch Rolls, Runout Table Rolls

### Transportation:

Camshafts, Carriers, Gears, Pulleys, Rail Spacers

## Physical Properties

Property	Measurement
Density (lbs/in <sup>3</sup> )	0.255
Modulus of Elasticity (psi x 10 <sup>6</sup> )	23-25
Modulus of Rigidity (psi x 10 <sup>6</sup> )	9-10
Poisson's Ratio	0.28-0.30
Relative Wear Resistance	Less than Fair
Coefficient of Thermal Expansion (x 10 <sup>-6</sup> /°F) <sup>****</sup>	6.4
Thermal Conductivity (BTU/hr/ft/°F)	22
Relative Damping Capacity <sup>***</sup>	5-20
Heat Treat Response (HRc)	50-55
Relative Magnetic Properties	High Permeability/Low Coercive Forces-Hysteresis Loss
Electrical Resistance (micro-ohms cm)	50-80

\* Based on 1212 = 100%

\*\* V-Notched Charpy @ RT

\*\*\* Natural Log of Rate of Successive Amplitude

\*\*\*\* Room Temperature to 212 °F

## Mechanical Properties:

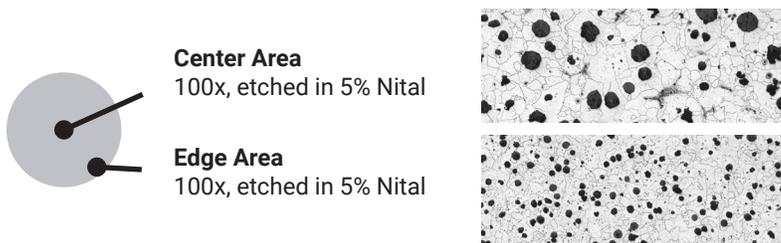
Hardness properties for various diameters are shown in the table. Hardness properties listed are minimum and maximum across the bar. For rectangles, squares and shapes, the hardness properties will depend on minimum and maximum section thickness and will be supplied on request.

Size Range		BHN	
Inches	mm	Min	Max
1 – 20	64-508	143	187

Tensile strength is determined from a longitudinal test specimen taken from mid-radius of the as-cast bar.

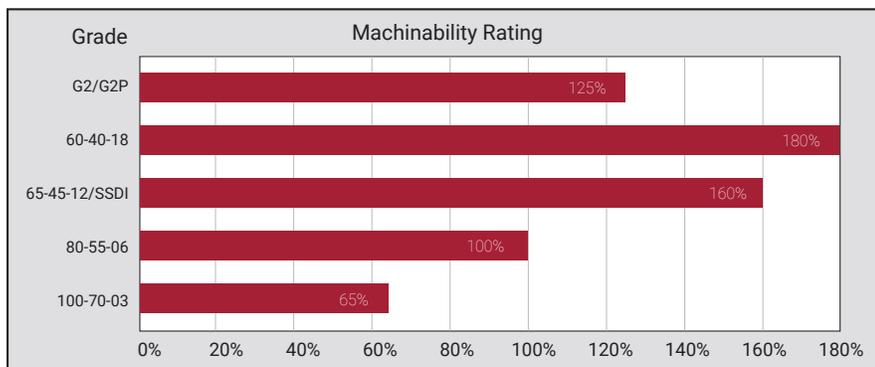
Mechanical Properties	
Tensile strength psi (min)	60,000
Yield strength psi (min)	40,000
Elongation (min)	18%

## Microstructure:



The microstructure consists of Types I & II nodular graphite as defined in ASTM A247. The matrix is 100% ferrite. The edge or rim will have a higher nodular count. Chill carbides will be less than 5% in any field at 100x and will be well dispersed.

## Machinability



\* Based on 1212 steel = 100%

## Heat Treat Response:

Dura-Bar 60-40-18 is provided in a heat treated state (sub-critical annealing). Dura-Bar 65-45-12 is heat treated to sub-critical temperatures to “ferritize” the matrix microstructure to produce Dura-Bar 60-40-18. As such, the heat treat response of Dura-Bar 60-40-18 is irrelevant as hardening would reverse the heat treatment process required to produce this grade.

## Chemical Composition:

Element	Percentage
Carbon*	3.50 - 3.90%
Silicon*	2.25 - 3.00%
Manganese	0.15 - 0.35%
Sulfur	0.025% Max
Phosphorus	0.05% Max

\*Carbon and silicon targets are specified for each bar size in order to maintain mechanical properties. Magnesium is added as an inoculant to produce nodular graphite.

## Applicable Specifications

NACE compliant, ASTM A395, ASTM A536

## Disclaimer

All of the above information is for reference only. Actual results are influenced by process variables and actual size of the raw material.

Visit [www.dura-bar.com/applications/index.cfm](http://www.dura-bar.com/applications/index.cfm) to see successful applications being made from Dura-Bar, including their design and cost benefits. Contact us today to discuss your application and how you can start saving with Dura-Bar.