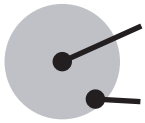
65-45-12 Ductile Iron

General Description:

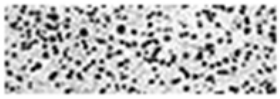
Dura-Bar 65-45-12 ductile iron contains nodular graphite in a matrix of ferrite with small amounts of pearlite. The ferritic structure gives excellent machinability with good surface finishes along with optimal impact strengths, fatigue properties, electrical conductivity and high magnetic permeability. This iron has approximately the same tensile and yield strengths as AISI 1020 steel in the as-rolled condition. This specification conforms to ASTM A536 grade 65-45-12

Microstructure:



Center Area
100x, etched in 5% Nital

Edge Area
100x, etched in 5% Nital



The microstructure consists of Types I & II nodular graphite as defined in ASTM A247. The matrix is ferrite with approximately 5-25% pearlite. The edge or rim will have a higher nodular count and will be mostly ferrite. Chill carbides will be less than 5% in any field at 100x and will be well dispersed.

Heat Treat Response:

Dura-Bar 65-45-12 can be oil quench hardened from 1600° F (885° C) to Rockwell C 50 minimum on the outside of the bar. Hardness in the core will be less than the hardness on the outside surfaces. Any grade of ductile iron can be quenched and tempered to 50 – 55 Rc. This grade also responds well to surface hardening methods such as flame or induction heat treating. It is well suited for austempering because of the low residual alloy content, and the highly ferritic matrix provides predictable growth with minimal heat-distortion. Get more details including typical Jominy end quench curve, methods and cycle times, and temperature effects by downloading the Dura-Bar Heat Treating Guide.

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.

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
01.000 - 02.000	25 - 51	156	217
02.001 - 03.000	51- 76	153	207
03.001 - 06.000	76 - 152	143	207
6.001 - 20.000	152 - 508	131	207

Tensile strength is determined from a longitudinal test specimen taken from mid-radius of the as-cast bar. In bars under 2.0 " diameter, elongation will be 9% minimum.

Mechanical Properties	
Tensile strength psi (min)	65,000
Yield strength psi (min)	45,000
Elongation (min)	12%

Typical 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, Tie Rod Nuts

Miscellaneous:
Plunger Pin

Power Transmission:
Coupling Hubs, Gears, Pulleys, Sprockets

Pump and Compressor:
Gears, Housings, Pistons, Rotary Screws, Rotors

Transportation:
Coupling Hubs, Gears, Pulleys, Rail Spacers, Sprockets

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