65-45-12X Ductile Iron

Description:

65-45-12X is an all-purpose grade of ductile iron available in larger sizes of rounds and rectangles/squares. With medium strength and ductility, 65-45-12X can be a suitable alternative to low and medium carbon steels. A predominantly ferritic matrix allows for it to be machined as opposed to steels and pearlitic irons, and it is appropriate for applications necessitating fatigue strength and ductility.

Applications

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

Automotive:
Gears

Glass Mold:
Bank Molds, Plungers

Machinery:
Bushings, Chuck Bodies, Gears, Housings, Journals, Side Frames, Spindle

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

Transportation:
Coupling Hubs, Gears, Pulleys, Sprockets

Physical Properties

Property	Measurement
Density (lbs/in^3)	
Poisson's ratio [ν]	
Modulus of elasticity (Tension) (psi) [E]	
Modulus of rigidity (Shearing) (psi) [G]	
Thermal conductivity (BTU/Hr/ft^2/inch/°F), (Range: Room Temp - 212°F)	
Thermal expansion coefficient(/°F) [a], (Range: 70 - 212°F)	
Damping capacity	
Electrical resistivity (μ Ohm. Cm) [ρ] (Cu =1.67)	
Magnetic properties (KiloGauss/Oersteds@100 Oersteds	
Heat treat response (Rc)	
Electrical Resistivity (Microhms x Cm)	

Mechanical Properties:

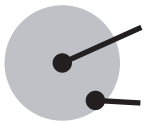
Hardness properties listed are minimum and maximum across the bar. For rectangles and squares the hardness properties will depend on minimum and maximum section thickness and will be supplied on request. This specification conforms to ASTM A536 grade 65-45-12.

Size Range		BHN	
Inches	mm	Min	Max
01.000 – 28.000	25 –711	131	217

Tensile strength of 65-45-12X is determined from a longitudinal test specimen taken from mid-radius of the as-cast bar.

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

Microstructure

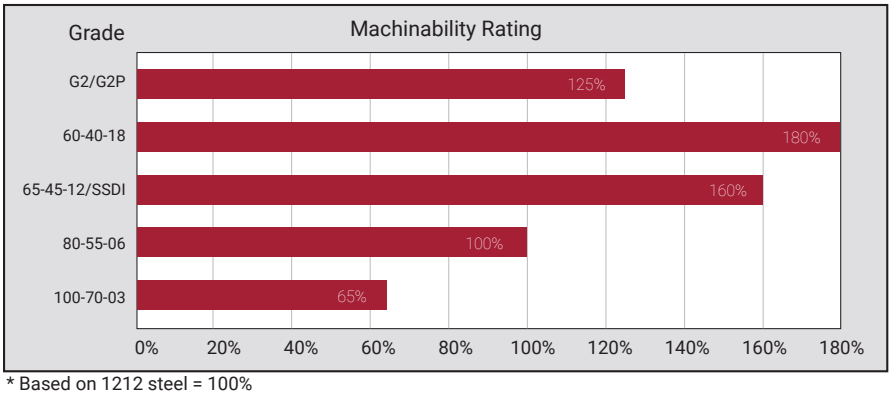


Center Area
100x, etched in 5% Nital

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 10-50% 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.

Machinability



* Based on 1212 steel = 100%

Heat Treat Response:

Dura-Bar 65-45-12X can be heat treated by conventional methods. Hardening can be accomplished by heating and quenching the material from 1600° F resulting in Rockwell C hardness up to 50 HRC. Induction and flame hardening can be performed but may require an additional pre-heat treatment to accomplish the desired hardness and microstructure.

Chemical Composition:

Element	Percentage
Carbon*	3.40 - 3.90%
Silicon*	2.30 - 3.10%
Manganese	0.10 - 0.40%
Sulfur	0.020% Max
Phosphorus	0.080% 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

N/A

Forms Manufactured

Rounds: 21.640" to 29.500"

Rectangles: 18.000" x 28.000" to 20.000" x 25.600"

Squares: 15.354" x 15.354" to 21.000" x 21.000"

Custom shapes available per customer request

Disclaimer

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

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