Dura-Bar® Metal Services

Product

G2S Gray Iron

Description

Dura-Bar G2S is a high strength highly pearlitic gray iron. It combines both superior strength and surface hardenability attributes. By an addition of molybdenum, G2S maintains excellent strength throughout the cross-section of the bar. A minimum of 40,000 psi tensile strength from the mid-radius is achieved. Using additional alloying elements, the carbon-rich material needed for effective induction or flame hardening is an additional compliment to G2S. G2S is ideal for applications where strength, hardenability, and creep resistance are required.

Applications

Oil/Gas:
Split/Locking Ring, Cone, Split Ring, Slip (Wicker), Oil Tool/Retainer, Bridge Plugs, Cement Plugs, Mandrels

Fluid Power:
Cylinder Blocks, Glands, Manifolds, Pistons, Rotors, Spools, Valves

Automotive:
Gears

Machinery:
Bushings, Gears, Gibs, Housings, Pulleys, Rams, Sheaves, Side Frames, Slides, Spindles, Ways

Miscellaneous:
Aluminum Molds Plates, Cams, Chain Sheaves, Core Boxes, Dies, Pattern Plates, Wheels

Power Transmission:
Gears, Pulleys

Pump/Compressor:
Gears, Housings, Liners, Pistons, Rollers, Rotors, Seals

Steel Mill:
Continuous Caster Rolls, Foot Rolls, Table Rolls, Torch Rolls

Transportation:
Brake Rotors, Cylinder Liners, Gears, Lash Adjusters, Pulleys, Shock Absorber Pistons, Valve Guides, Valve Seat Inserts

Physical Properties

Property	Measurement
Density (lbs/in^3)	0.26
Poisson's ratio [ν]	Min: 0.26 ; Max: .285 ; Average = .2725
Modulus of elasticity (Tension) (psi) [E]	1.77E+07
Modulus of rigidity (Shearing) (psi) [G]	6,943,529
Thermal conductivity (BTU/Hr/ft^2/inch/°F), (Range: Room Temp - 212°F)	N/A
Thermal expansion coefficient(/°F) [a], (Range: 70 - 212°F)	N/A
Damping capacity	100-500*
Electrical Resistivity (Microhms x Cm)	78 - 104 **
Magnetic properties (KiloGauss/Oersteds@100 Oersteds	Stress less influence on magnetic properties. Residual magnetic is less affected by high temp. Intricate shapes economically casted.
Heat treat response (Rc)	N/A

*If constant maximum stress selected, then specific damping capacity can be related to tensile strength for Gray irons. Damping can be related to chemical analysis/composition and microstructure.'

**Specific resistivity of all irons increases with temperature. Chemical composition and microstructure also play roles in determining electrical resistivity. Increasing amounts of carbon/silicon increase ER. More coarse flakes results in higher ER than for fine flake gray iron.

Mechanical Properties

Brinell hardness values for nominal as-cast diameters are shown in the table. Hardness properties listed are minimum and maximum across the bar. Hardness values for rectangles and squares are a function of the height and width ratios and will be supplied on request.

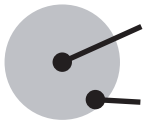
Size Range		BHN	
Inches	mm	Min	Max
2.500 – 6.00	64 - 152	207	290

Tensile strength of Dura-Bar G2S is determined from a test bar removed from the mid-radius of a continuous cast bar. Test bars from the mid-radius will meet the minimum 40,000 psi listed in the table below. Since mid-radius test bars meet a 40,000 psi class of iron, separately cast bars are cast for reference only.

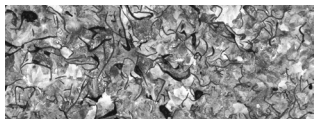
Mechanical Properties	
Tensile strength psi (min)	40,000
Yield strength psi (min)	N/A *
Elongation (min)	N/A*

* Gray iron will not yield/elongate before fracture.
The behavior of gray iron is non-ductile.

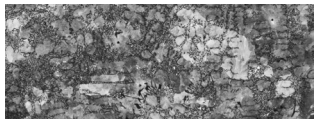
Microstructure



Center Area
100x, etched in 5% Nital

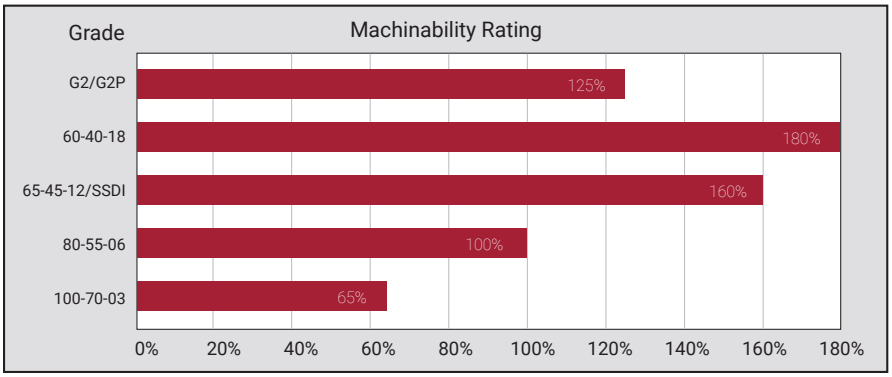


Edge Area
100x, etched in 5% Nital



The microstructure will contain Type VII, A, size 4-6 graphite as defined in ASTM A247. The matrix is fully pearlitic. The edge or rim will consist of Type D, size 4-6 graphite in a matrix consisting of 80% pearlite. Chill carbides will be less than 5% in any field at 100x and are well dispersed.

Machinability



* Based on 1212 steel = 100%

Heat Treat Response

Dura-Bar G2S can be hardened by fast methods, such as flame and induction hardening. Carbon-rich pearlite in the rim of the continuous cast bars will effectively transform to martensite (hard phase of iron). Contrasted with a more ferritic rim, continuous cast bars can result in untransformed microstructure and thus a less ideal material hardness after heat treatment.

In addition to surface hardening, Dura-Bar G2S can be heat treated by conventional quench and temper methods. 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*	2.60 - 3.75%
Silicon*	1.80 - 3.00%
Manganese	0.60 - 0.95%
Sulfur	0.07% Max
Phosphorus	0.12% Max

*Carbon and silicon targets are specified for each bar size in order to control the size and shape of the graphite flake. Alloying elements are used to promote enhanced tensile strength and to stabilize the pearlitic structure.

Applicable Specifications

ASTM A247

Forms Manufactured

Rounds: 3.500” to 6.000”

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.

*Visit **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.*