

Austempered Ductile Iron

Ductile iron can be heat-treated to enhance wear resistance and mechanical properties. The standard methods of heat-treating include quench and temper, induction, and flame hardening. In each of these methods the matrix is transformed to martensite, which will be stronger and more wear resistant than either pearlite or ferrite.

Another method of heat-treating involves heating the part to obtain austenite and then quenching it above the martensite start temperature but below the pearlite transformation temperature, and holding the part at this temperature for a time that is sufficient to produce an ausferrite matrix. This process is called austempering, and parts that have been heat-treated in this manner are commonly referred to as austempered ductile iron, or ADI. Austempered ductile iron parts have high impact properties, excellent wear resistance, and higher tensile strengths than parts that have been quench and tempered.

Any grade of ductile iron can be austempered but it is sometimes necessary to add nickel and copper to produce the desired microstructure in parts that have heavy sections (greater than 2").

The table below contains the expected minimum properties of ADI.

Standard ADI Grades

Grade	Tensile Strength		Yield Strength		Elongation %	Impact Energy*		Typical Hardness BHN/(B.I.D.)
	(MPa)	(KSI)	(MPa)	(KSI)		(J)	(ft-lbs)	
1	850	124	550	80	10	100	74	269 - 321 (3.4 - 3.7)
2	1,050	153	750	109	7	80	59	302 - 363 (3.2 - 3.5)
3	1,200	175	900	131	4	60	45	341 - 444 (2.9 - 3.3)
4	1,400	204	1,100	160	1	---	---	388 - 477 (2.8 - 2.9)
5	1,600	233	1,300	189	---	---	---	444 - 555 (2.6 - 2.9)

* Tested at 22°C +/- 7°C

Dura-Bar Sizes and Shapes

Dura-Bar products are produced in a wide range of sizes, shapes, and lengths.

Rounds		Tubes	
Nominal Diameter *	Increments Available	Inside Diameter	Outside Diameter
0.625" - 4.000"	0.125"	1.500" - 7.000"	2.250 - 16.000"
4.250 - 11.000"	0.250"		
11.500 - 15.000"	0.500"		
16.000 - 20.000"	1.000"		

*As-cast Dura-Bar will finish at the size specified with minimum stock removal. Centerless ground bars are available up to 6.000" diameter.

Rectangles and Squares

Rectangular sizes up to 18.500" thick and 22.000" wide are available. Standard square sizes range from 1.250" to 12.250".

Special Profiles

Half-rounds, quarter-rounds, and other shapes are quoted on request.

Immediate Shipment

Dura-Bar is more than just a product -- it's a service. We will cut bars and tubes to any specifications or lengths and ship them immediately. We maintain a large inventory of bars and tubes in a wide range of sizes and shapes, eliminating the need for you to hold a costly inventory of parts or castings. Call Industrial Tube & Steel for more information on how Dura-Bar products will increase your machining productivity.

Typical Applications for Dura-Bar

- Bearings • Bushings • Cams • Conveyor Guide Rollers •
- Couplings • Cylinders • Dies • Gears • Pistons • Pulleys • Rams •
- Rotors • Seal Rings • Shafts • Sprockets • Valve Bodies • Valve Guides •
- Gibs • Ways • Collets • Sleeves • Rolls •