About Copper, Brass, and Bronze

Although copper, brass, and bronze are distinct alloys, they're often collectively called red metals because they share many common characteristics. These alloys have a high copper content that provides inherent corrosion resistance as well as an attractive russet coloring. Red metals are worked (wrought) or cast into shape and are commonly joined by soldering or brazing;however, some can be welded.

Copper alloys have a minimum of 99.3% copper content. They are an excellent conductor of heat and electricity and are commonly used for bus bars and wire connectors in electrical applications.

Brass alloys consist primarily of copper, but they can contain as much as 40% zinc, which increases their machinability. They are often used for nuts, rivets, hinges, and locks.

Bronze alloys, while mostly copper, contain small amounts of tin, iron, and sometimes zinc. The alloys designated as bearing bronze have a good combination of low friction and high wear resistance, making them the best choice for use as bearings. The other bronze alloys are widely used for gears, valves, and pump parts.

Alloy Comparison

Use the charts below to identify the best material for your application. Circles indicate that a majority of a material's shapes and sizes meet the applicable rating. Yield strength is approximate and may vary by size and shape.

● Excellent
◓ Good
○ Poor

Alloy Types	Min. Yield Strength, psi	Hardness (Rockwell)	Machinability	Formability	Electrical Conductivity	Weldability
Copper						
Multipurpose 110	33,000	F40	○	●	●	○
Super-Conductive 101	10,000	F60	○	●	●	◓
Easy-to-Machine 145	18,000	—	●	◓	●	—
High-Strength 182	40,000	B60	○	●	◓	○
Weldable 122	———	—	○	●	◓	—
Brass						
Ultra-Machinable 360	15,000	B35	●	○	○	—
Formable Easy-to-Machine 353	25,000	B60	●	◓	○	—
Easy-to-Machine Architectural 385	16,000	B42	●	○	○	—
Easy-to-Form 260	———	—	○	●	○	◓
Machinable and Formable 330	60,000	B73	◓	●	○	○
Weldable 464 Naval	20,000	B55	○	◓	○	◓
Machinable 485 Naval	25,000	B60	◓	○	○	—
Bearing Bronze						
Multipurpose 932	18,000	B34	◓	—	○	—
Machinable 936	21,000	B26	◓	—	○	—
Corrosion-Resistant 954	28,800	B80	◓	—	○	◓
Wear- and Corrosion-Resistant AMPCO 18	37,000	B88	◓	○	○	◓
Corrosion-Resistant High-Strength 863	62,000	B97	○	—	○	○
High-Strength 544	50,000	—	◓	◓	○	—
Self-Lubricating Oil-Filled SAE 840/841	11,000	—	◓	○	—	—
High-Temperature Graphite-Filled SAE 841	8,500	—	◓	○	—	—
Bronze						
High-Strength 630	60,000	—	○	—	○	◓
Machinable High-Strength 642	42,000	B80	◓	○	○	—
Easy-to-Weld Corrosion-Resistant 655	43,000	B75	○	●	○	●
Machinable Corrosion-Resistant 316	28,000	—	◓	◓	○	○
Corrosion-Resistant Easy-to-Form 220	45,000	B58	○	●	○	◓
Very High-Strength 510	80,000	—	○	●	○	◓

Hardness

The chart below compares the hardness of metals using different scales; the larger the number, the harder the material. As metal gets harder, it becomes more wear resistant, but may also become less malleable. Red metals generally fall onto the soft end of the spectrum.