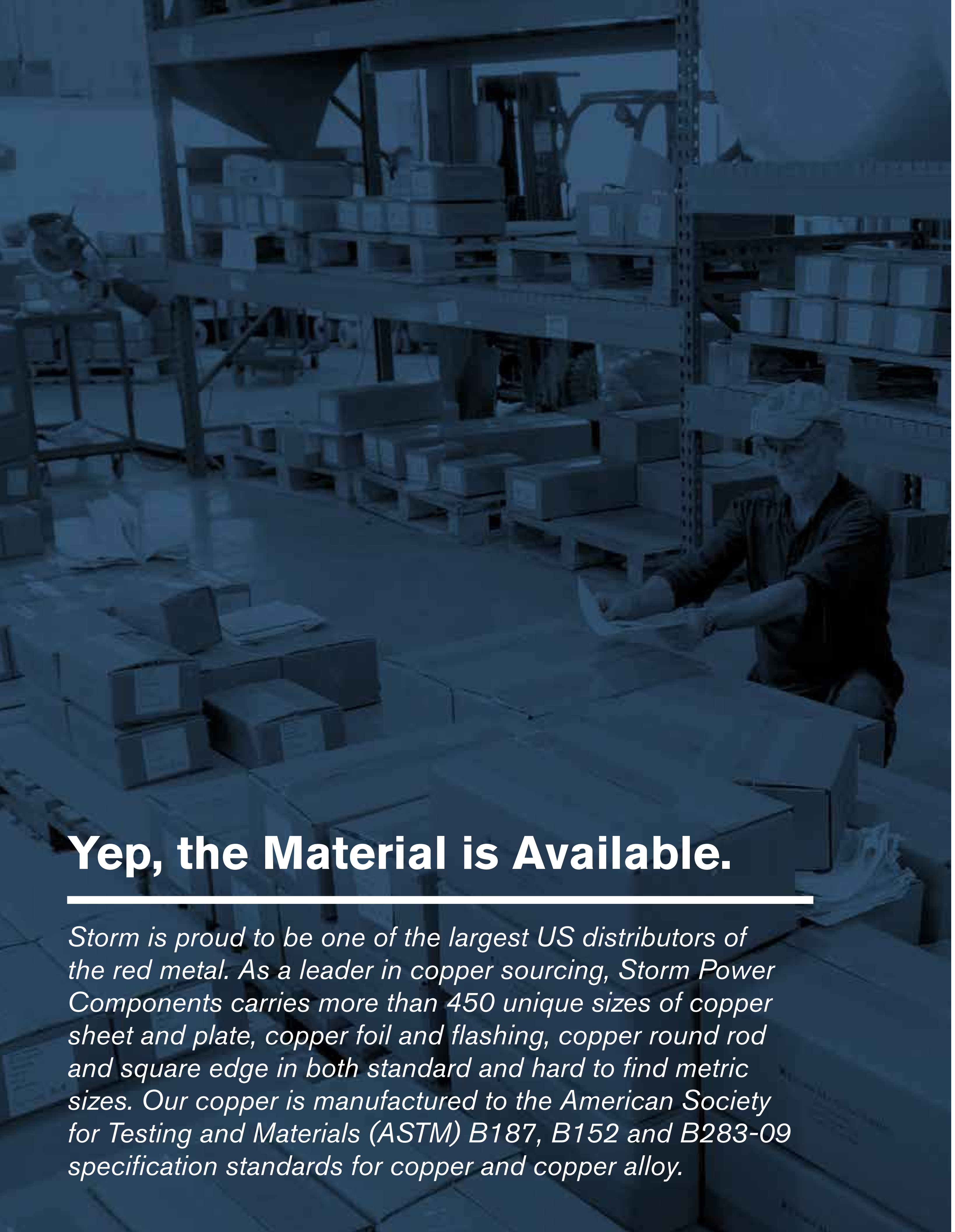
STORM POWER COMPONENTS

PRODUCT GUIDE

Copper Specifications Guide

Everything you need to know...



Yep, the Material is Available.

Storm is proud to be one of the largest US distributors of the red metal. As a leader in copper sourcing, Storm Power Components carries more than 450 unique sizes of copper sheet and plate, copper foil and flashing, copper round rod and square edge in both standard and hard to find metric sizes. Our copper is manufactured to the American Society for Testing and Materials (ASTM) B187, B152 and B283-09 specification standards for copper and copper alloy.

Copper Specifications Guide

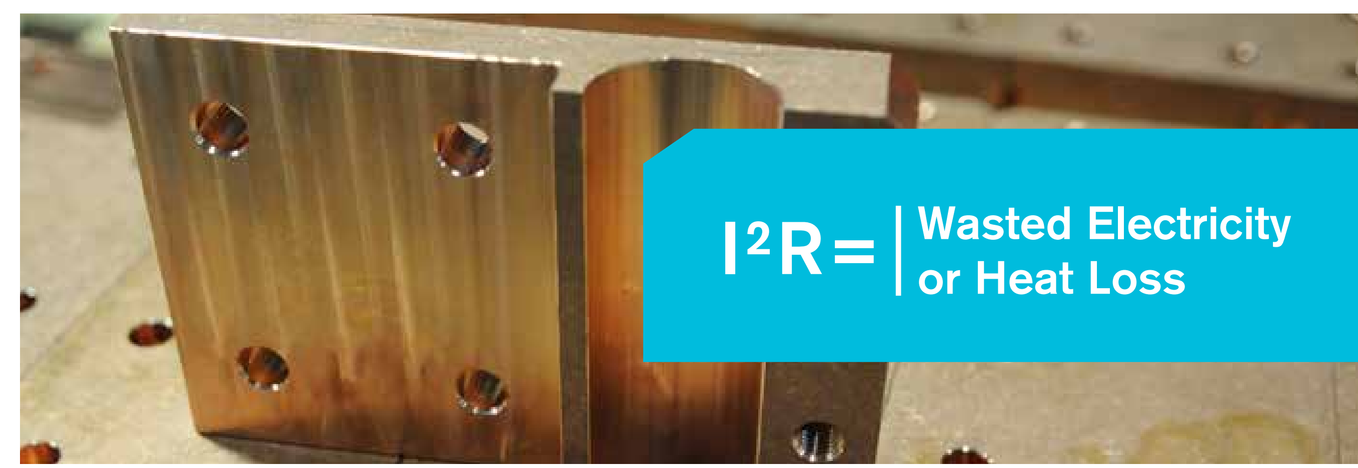
The variables facing the designer of a copper fabrication are many.

The impact these variables will have on the finished copper component range from significant to minimal. The purpose of the following information is to provide an awareness for the designer as to the importance of these copper specifications.

Copper Busbar Efficiency

Busbar systems for industrial and commercial facilities are often designed to minimize first costs, with the busbar sized to the minimum permitted by safety considerations. In such cases, operating costs are ignored at the design stage and, as a result, large amounts of electrical energy are wasted in service due to heating. Larger cross-sections of busbar result in more efficient systems with lower operating costs. The optimum system is one that properly balances first costs with operating costs in order to minimize total life-cycle cost.

Energy is wasted in any system because a portion of the electricity flowing through the conductor is converted to heat rather than being delivered as usable electrical energy. The determinants of the rate at which heat is generated by a system are: the amperage of the system and several factors which determine the resistance: the dimensions of the busbar, the layout of the busbar, and the conductivity of the busbar metal.



The effect of electrical conductivity on the heat loss of the system is straightforward: There is a proportionally inverse relationship between the two. The effects of the amperage and the dimensions of the busbar are more subtle, and have to be considered together. For a given busbar size, increasing the amperage of the system will increase the heat loss, while increasing the cross-section of the busbar will decrease the electrical resistance, and therefore the heat loss. These two effects are nonlinear, however. Thin, wide busbar systems have better heat-dissipation characteristics, and therefore run cooler, than busbar systems of equal cross-sectional area, but with less surface area. Since electrical resistivity rises with temperature, the thinner, wider configurations are better conductors.

Copper Alloys

C11000 Electrolytic
Tough-Pitch Copper (ETP)

The most common type of copper used. With a minimum copper content of 99.90%, and an electrical conductivity of 101% IACS, it is used in such diverse applications as electrical conductors, roofing and flashing, heat exchanger fins, tanks, and hollowware.

C11400 & C14300
Coppers

Used where it is desired to avoid softening in copper that is soldered at relatively high temperatures, as in automotive heater and radiator fins. The addition of a small percentage of silver, as in C11400 copper, is effective without a significant change in thermal and electrical conductivities. The addition of .07% cadmium to C14300 copper has a similar result, except that the conductivities are reduced by approximately 4%.

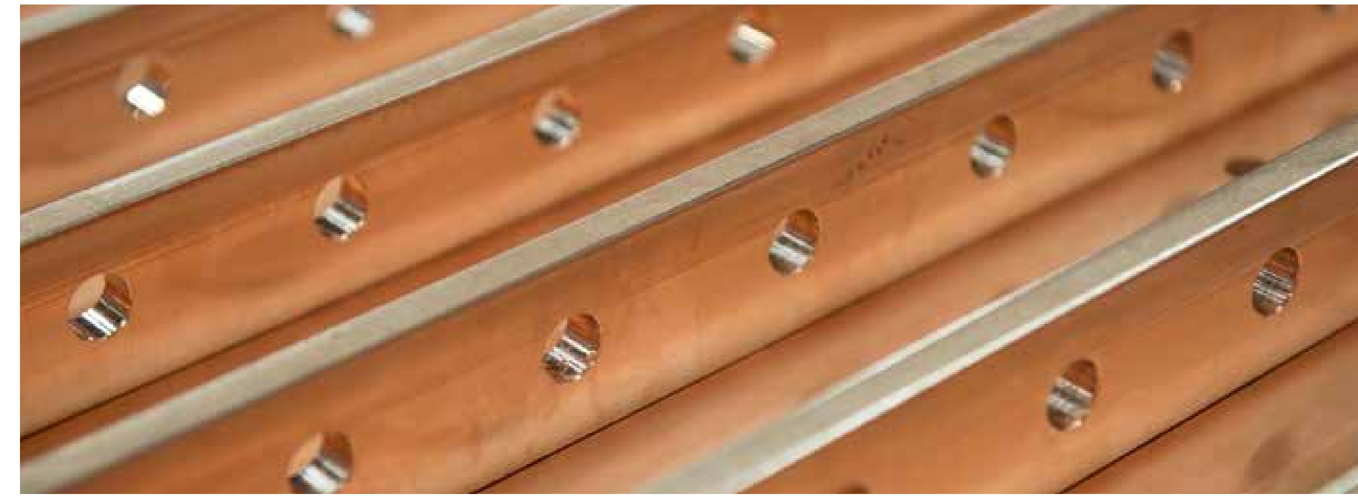
C10100 & C10200
Oxygen-Free Coppers

Used where the presence of oxygen in copper is undesirable, as in certain electronic parts, or metal to be welded. These coppers have higher purities than ETP and are cast by the refineries in a controlled atmosphere with oxygen excluded. Cryogenic grades of C10100 copper are also available.

C12200
Phosphorous Deoxidized Copper (DHP)

Deoxidized with phosphorous, making it relatively easy to weld and high-temperature braze. However, DHP has a much lower electrical conductivity—approximately 85% IACS.

Type of Metal	% IACS
110 Electrolytic Tough-Pitch Copper	101
102 Oxygen-Free Copper	101
145 Tellurium Copper	95
Aluminum EC	62
Aluminum 6101	56
505 Phosphor Bronze 1.25%	48
Aluminum 5052	35
Stainless Steel 302	3



Temper

The hardness of the copper or copper alloys are obtained by annealing or cold finishing after the annealing process. Unlike steel and aluminum, copper and copper alloys are not strengthened by heat treating in the final stages of processing. During annealing, air is excluded by flooding the furnaces with protective atmospheres controlled to prevent scaling, staining, or the penetration of the metal by oxygen or hydrogen. Cold finishing is defined as the permanent deformation or strain produced in the metal by external forces that are applied while the metal's temperature is below its recrystallization point. It can be achieved by rolling, bending, stretching, or hammering the metal while it is cold.

Copper Rod & Bar

Annealed Metal *Soft*
Recrystallized Grains

The most common type of copper used. With a minimum copper content of 99.90%, and an electrical conductivity of 101% IACS, it is used in such diverse applications as electrical conductors, roofing and flashing, heat exchanger fins, tanks, and hollowware.

1/2 Hard Metal *Cold Worked*
Distorted & Broken-up Grains

Used where the presence of oxygen in copper is undesirable, as in certain electronic parts, or metal to be welded. These coppers have higher purities than ETP and are cast by the refineries in a controlled atmosphere with oxygen excluded. Cryogenic grades of C10100 copper are also available.

Full Hard Temper *Cold-Worked*
Much Distorted & Broken-up Grains

Deoxidized with phosphorous, making it relatively easy to weld and high-temperature braze. However, DHP has a much lower electrical conductivity—approximately 85% IACS.

Sheet, Strip, & Roll Copper

Cold Rolled Annealed Temper *Soft Metal*
Recrystallized Grains

Produced by annealing hard metal. Standard soft roll copper is commonly used for deep drawing and spinning. The surface on drawn parts is suitable for most polishing requirements.

1/2 Hard Metal *Cold Worked*
Distorted & Broken-up Grains

Produced by cold rolling soft metal to the finish thickness. Special Hard Temper suitable for 90 degree bends copper are also available.

3/4 Hard Metal *Cold Worked*
Much Distorted & Broken-up Grains

Produced by cold rolling soft metal to the finish thickness. Suitable for 90-degree bends. Favorable to blanking, shearing, and machining.

Soft Temper Annealed Metal *Soft Metal*
Recrystallized Grains

Produced by annealing hard metal, commonly used by sheet metal craftsmen. Used for moderate drawing and cupping. The surface on drawn parts is suitable for most polishing requirements.

1/4 Hard Metal *Cold Worked*
Distorted & Broken-up Grains

Produced by cold rolling soft metal to the finish thickness. Special hard temper suitable for shallow forming.

About Storm Power Components

Storm Power Components is a fabricator of custom copper components. From back-up power systems, cell towers, and sub stations, to earth-moving equipment, motive power, and alternative energy applications, our industrial-strength parts are trusted by original equipment manufacturers around the world to power, connect, and protect their products.

As an industry veteran for more than 20 years, the company is squarely focused on delivering improved responsiveness, price advantage and shorter distribution channels. The result is its ability to manufacture superior-quality parts with speed and accuracy, while providing customers a delightfully uncommon experience. Storm Power Components, Co, a privately held company, and is an ISO 9001-2008 certified organization headquartered in Decatur, Tennessee. For more information, please visit www.stormpowercomponents.com.

Request a Quote Today!

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