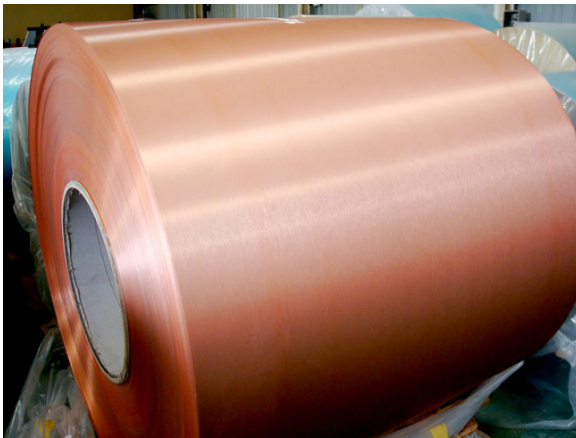


## **COPPER VS ALUMINUM**

### **WHICH IS BETTER?**



#### **AT ISSUE**

There is a common misconception that a distribution transformer with copper windings is in some way more efficient, more reliable, or has higher short circuit strength when compared to a transformer with aluminum windings.

#### **RECOMMENDATION**

Improvements in technology regarding the use of aluminum in transformers have made aluminum transformers the ideal choice for today's applications.

#### **RATIONALE**

**Operating Cost** - Cooper Power Systems designs aluminum wound transformers with windings of a larger cross-sectional area than would be used for a copper wound unit. This larger cross-sectional area translates to a lower current density, and an equivalent operating temperature. By

reducing the current density in the windings, a low-loss design can be achieved with aluminum or copper windings.

**Reliability** - A transformer's life is defined by the life of its insulation system. Because Cooper aluminum-wound and copper-wound units run at equivalent operating temperatures, the insulation systems age at the same rate for each design.

**Lower Cost First** - Whether low losses are the goal or not, aluminum windings are less expensive than copper windings. The following example shows two equivalent-loss designs, one with aluminum windings and one with copper windings.

	ALUMINUM	COPPER
No-load losses (CW)	2,607	2,599
Load losses	13,261	13,194
Total losses (TW)	15,868	15,793
Efficiency at 100% load	99.4%	99.4%
Dimensions (H x W x D)	73 x 71 x 42	73 x 69 x 38
Price	\$40,000	\$50,000

*In this example, the losses are roughly equivalent, but the price of the aluminum-wound unit is \$10,000 (20%) less expensive.*

## THE BOTTOM LINE

Cooper Power Systems designs its aluminum-wound coils using the same thermal, dielectric and mechanical performance requirements as for its copper-wound coils. In padmount and substation designs, Cooper aluminum-wound units and copper-wound units serve their loads equally well.

*This comparison article provided by Cooper Power Systems. Some minor modifications were made to make this article more "generic" and applicable to all brands of transformers. The essential portions of this article have been unchanged.*