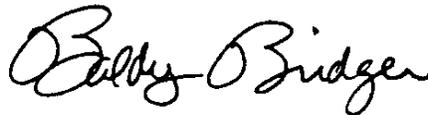

Plating of Contact Surfaces in Switchgear and Circuit Breakers

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The various ANSI standards covering metal-enclosed switchgear and circuit breakers used in this switchgear prescribe temperature rise limits for various parts of the equipment. Included are limitations for buses with plated and unplated joints in switchgear, and for plated and unplated contacts and connections in circuit breakers. In all cases the temperature rise allowed is considerably higher for plated connections than it is for unplated connections. Typically, the limit for unplated copper connections is 30°C rise, while the limit for plated connections is 65°C rise. The higher temperature rise is allowed for plated connections because plated copper does not oxidize nearly as rapidly as bare copper. Copper oxide is not a good conductor, and once the oxide forms, the resistance and the temperature rise of the conductor usually increase rapidly. Since limiting the temperature rise is 30°C would require manufacturers to double the amount of copper used, joints are almost universally plated.

The two materials commonly used for plating are silver and tin. The standard for high voltage circuit breakers speaks of "silver, silver alloy, or equivalent" surfaces, with "equivalent" being undefined. This standard was last revised in 1979. The low-voltage and medium-voltage switchgear standards, revised in 1987, speak of "silver surfaced, tin surfaced, or equivalent" connections.

Which material is better, silver or tin? At Powell, we generally use silver, particularly for sliding contacts. Silver plating is harder than tin plating, and withstands the stress of a moving joint, such as a hinge point or a primary disconnect, better than tin plating. However, tin plating is superior in certain industrial atmospheres, such as those containing hydrogen sulfide. On request, Powell will provide tin plating on the connections of the bus bars in equipments. For various technical and manufacturing reasons, it is not practical to substitute tin for silver on surfaces within circuit breakers, or on circuit breaker primary disconnects. If the atmosphere attacks silver surfaces, they should be coated with contact lubricating grease to prevent corrosion problems.



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