

# Design of Shading Coils for Minimizing the Contact Bouncing of AC Contactors

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**Abstract-** For many decades electromechanical contactors have been widely used in the industry, and over 80% are equipped with AC powered coils. Electromechanical contactors have the drawback of the mechanical movement of some of their parts and the wear related with it. This movement causes the contacts to impact during closure, producing a bouncing of the contacts and consequently the estimated life of the contacts is dramatically reduced.

The coil of the contactor can be powered by an AC or a DC supply. When dealing with DC powered coils, they generate a constant magnetic field that guarantees an appropriate closing of the contacts. However, AC powered coils generate sinusoidal magnetic fields which produce a force that drops to zero twice each cycle (50/60 Hz). This creates an undesired chatter or pulsation of the contacts. This harmful effect can be cancelled by using a shading ring placed in the contactor core. In a well-designed shaded pole contactor the magnetic force should never drop below the springs force in order to avoid the chattering of the contacts.

In this work the influence of shading rings parameters on the behavior of the dynamic response of the contactor is studied and results from experimental and simulated data are presented.