

Evaluating Core Condition

LEXSECO determined that the most important indication of core steel condition is the watts of electrical energy lost per pound (kilogram) of core steel when the core is excited to operating conditions. Common electrical grades of core steel have inherent Epstein test rated watts per pound (kilogram) losses ranging from 1 to 2 watts per pound (kilogram) depending upon application. This value is increased by as much as a factor of 1.5 to 2 once this steel is punched and assembled into motor cores. This increase may be attributed to a combination of the following:

1. Lamination punching or stamping burrs
2. Lamination thickness
3. Lamination clamping pressure
4. Type of insulation coating used on the steel
5. Heat treatment process used on punched laminations
6. Lamination assembly method
7. Silicon content and hardness of the steel
8. Heavy welds across the back of the core stacking

Watts per pound (kilogram) core losses may be divided into hysteresis and eddy current losses. Hysteresis loss results from the alternating frequency reversals shifting molecules to adjust polarity and is dissipated in the form of heat. Hysteresis loss does not change with varying steel thicknesses. Eddy current loss is the cross current flow found in the lamination assembly. Unlike hysteresis loss, eddy current loss increases proportionally with steel thickness. Like hysteresis loss, eddy current loss is dissipated in the form of heat.

The LEXSECO Core Loss Tester relies principally upon the watts per pound (kilogram) criterion to determine core loss. In addition, the software records the ampere turns per inch (centimeter) (AT/in or AT/cm), which is a measurement of the magnetizing power required to produce a certain flux density in the iron laminations. Similar to the watts per pound (kilogram) calculation, the lower the ampere turns per inch, the more efficient the core.

The LEXSECO software interprets the meter readings, makes a judgment regarding overall core condition (OK, MARGINAL, or BAD), and produces a report reflecting the core condition judgment along with recommendations for further action including "hot spot esting."

Hot Spot Testing

Hot spot testing verifies the watts per pound (kilogram) reading. Upon completion of the metering portion of the core loss test, the computer software instructs the operator to apply a higher excitation current. After approximately 1 minute, imperfections and problems with the core should become apparent through a simple temperature check of core surface.