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The time for chiller startup is upon many companies. With it comes a decades-old challenge: how to verify the condition of a chiller motor before startup.

Common testing for electric motors includes vibration analysis for mechanical components and insulation-resistance (Meg-Ohm) testing for winding insulation. Vibration analysis, however, is challenging and may miss critical findings due to the location of bearings and mechanical components. Insulation-resistance and high-voltage tests are frowned upon by a number of hermetic chiller manufacturers. Improper information on the interpretation of results and understanding of test standards creates additional hurdles.

Modern technologies consisting of a combination of Electrical Signature Analysis (ESA) and Motor Circuit Analysis (MCA) utilizing the methodology presented in IEEE Standard 1415-2006, "IEEE Guide for Induction Machinery Maintenance Testing and Failure Analysis," can now be applied in evaluating chiller motors. ESA utilizes the voltage and current information related to the electric motor in order to evaluate the power supply, dynamic condition of the motor's electrical and mechanical components, and the general condition of the driven equipment. The technology can detect broken rotor bars and bearing issues with a high degree of accuracy, and can also be used to trend conditions for Time to Failure Estimation™ (TTFE) as part of a PdM program.

The MCA method that is used avoids the issue of high-voltage testing both for winding shorts and insulation-to-ground fault aggravation through a series of low-voltage techniques that detect faults, as well as trend degradation and contaminant impact on motor windings. (Moisture and acids in refrigerants and lubricating oils, and coil movement during startup wear away the inter-turn and ground-wall insulation systems within the machines.)

MCA testing must be performed on de-energized equipment—*allowing evaluation prior to chiller startup each cooling season.*
While IEEE 43-2000, "IEEE Recommended Practice for Insulation Resistance of Rotating Machinery," calls for 5 Meg-Ohms in machines under 1000 volts and 100 Meg-Ohms in those over 1000 volts, hermetic machines often have much lower pre-startup readings. In the past, it's been hard to determine if the issue will cause a motor failure at startup, requiring the owner to risk startup, and then re-check after the machine has run. MCA test results more accurately identify the potential risks and causes for low test results.
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Howard Penrose is VP of Repair Services (Operations) for Dreisilker Electric Motors, Inc. (http://www.dreisilker.com) If motors are one of your key interests and/or job responsibilities, Penrose's Post-Conference Workshop, "Motor Systems Maintenance and Management," at MARTS 2010 is one of the best places you can be this spring. For details and to register, go to www.MARTSconference.com

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