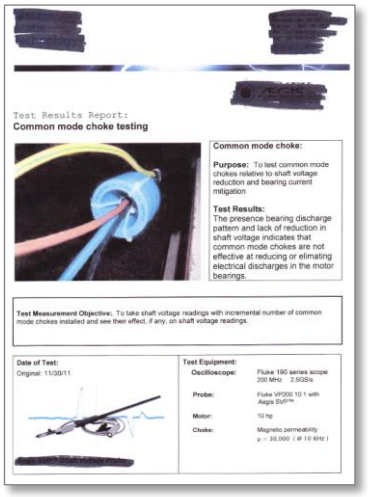
CoolBLUE® and NaLA®

A *MORE* Powerful Solution

CoolBLUE Guarantee of Motor Bearing Protection

Have you seen this letter from a grounding ring manufacturer?



Test Results Report:
Common mode choke testing

Common mode choke:

Purpose: To test common mode chokes relative to shaft voltage reduction and bearing current mitigation

Test Results:
The presence bearing discharge pattern and lack of reduction in shaft voltage indicates that common mode chokes are not effective at reducing or elimating electrical discharges in the motor bearings.

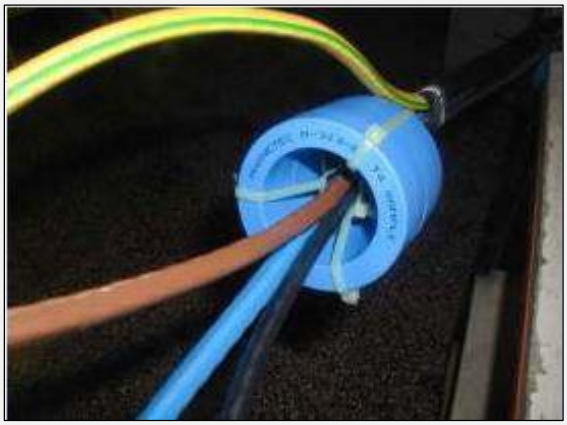
Test Measurement Objective: To take shaft voltage readings with incremental number of common mode chokes installed and see their effect, if any, on shaft voltage readings.

Date of Test:
Original: 11/30/11

Test Equipment:
Oscilloscope: Fluke 190 series scope 200 MHz 2.5GS/s
Probe: Fluke VP200 10:1 with Aegis SVP™
Motor: 10 hp
Choke: Magnetic permeability μ = 30,000 (@ 10 KHz)

The purpose of the "Common Mode Choke Testing" (from this particular manufacturer) was to somehow prove that a common mode choke does not prevent destructive currents from damaging bearings in a VFD motor drive system.

Here is an opening picture, on their "test" document, copied directly from the MH&W website, www.coolblue-mhw.com, and text on this "test":



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The very declaration of this "test" omits the purpose of a common mode choke. Taken directly from Wikipedia, a choke:

> *"In electronics, a **choke** is an inductor used to block higher-frequency **alternating current** (AC) in an electrical circuit, while passing lower-frequency or direct current (DC). A choke usually consists of a coil of insulated wire often wound on a magnetic core, although some consist of a donut-shaped 'bead' of ferrite material strung on a wire. **The choke's impedance increases with frequency**."*

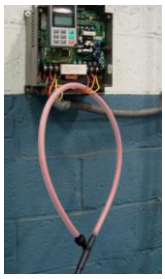
The very declaration of this manufacturer to reduce shaft voltage with a choke is faulty. This manufacturer declares that shaft voltage damages bearings. Voltage is only one part of the component of power. Example: Measured 30 volts on the shaft with 1 amp of current. This equals 30 watts of power. If we reduce the current to 0.1 amps, there is now only 3 watts of power. Current and power does the damage. Let's talk current. Plus, grounding brushes just divert power somewhere else. They don't remove anything.

Next, on this "test", is the statement:

> **Test Measurement Objective:** To take shaft voltage readings with incremental number of common mode chokes installed and see their effect, if any, on shaft voltage readings.

Again, this is not the point of a choke. Incorrect "objective" statement number 2.

To accurately measure current, which is the proper objective, a shaft voltage brush is not the correct tool. The only accurate tool for measuring current is with a high frequency Rogowski coil and oscilloscope. Evaluating shaft voltage is faulty.

Here is a typical set up for measuring high frequency common mode currents. Rogowski coil and handheld oscilloscope.	  

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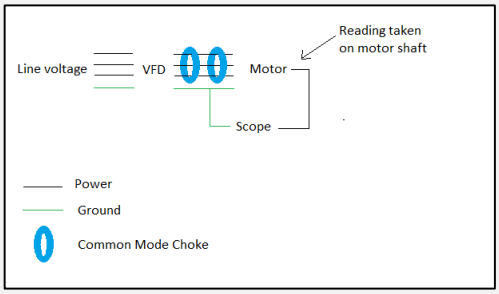
As you can see, this is a much easier, cleaner, and safer way to measure currents than with a shaft brush, too.

On the "test", the CoolBLUE® cores are correctly placed around the power phases…not ground or shielding, so this part of the test is correct. However, setup consists of unknown cores. Suspect cores are used in CT (current transformers). The cores used in this test are not CoolBLUE® cores, therefore the test is invalid…once again.

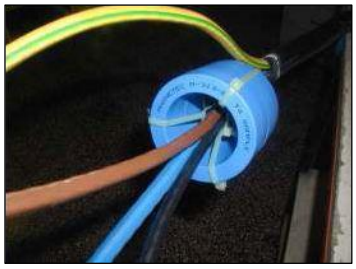
Original Test Setup Test date: 11/30/11

Setup: The test setup consisted of a VFD driven 10 hp motor where increasing numbers of common mode chokes with a magnetic permeability of μ = 30,000 (@ 10 KHz) installed on the VFD output wires. Baseline shaft voltage readings were taken with no chokes installed, and subsequent readings were taken with 1, 2, 3, 4, & 5 choke installed.



Page 3 of "test".

Page 1 of this "test" shows a picture of CoolBLUE®, from www.coolblue-mhw.com website, with the cores around three power phases. Notice, in particular, that there is plenty of space between the cores and the cables.



According to the "test" setup in this document, here is an actual picture of the cores this particular manufacturer used. As seen, there is no air space between cores and cabling. Also noticeable is the color and type of core. These cores are epoxy coated (lighter blue), and not in the blue case.

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The cores used in this "test" are not CoolBLUE®. These particular cores are epoxy coated CT (current transformer) cores. All CoolBLUE® and NaLA® cores are in plastic cases. Also, the cores are too tight a fit around the wires.

Using the wrong cores for the application is like putting a grounding brush/ring from a 200hp motor shaft, on a 1hp motor. May look correct, but doesn't work.

Lastly, the "test" goes on to "prove" that there are no clear reductions in shaft voltage. Back to basic electronic fundamentals. A choke, by its very definition, blocks high frequency current. We don't care about voltage…we care about current and power.

Conclusion of this "test"?

> Based on the readings collected common mode chokes appear to have no effect on reducing shaft voltages. Bearing discharges of significant voltage amplitude – above 20V – were present regardless of how many chokes were installed. The presence of these discharges and lack of reduction in shaft voltage indicates that common mode chokes are not effective at reducing or eliminating electrical discharges in the motor bearings.

Based on this conclusion, your customers will be very happy with CoolBLUE® and NaLA® cores for reduced costs compared to hybrid bearings/ground rings, no downtime, no shaft maintenance, longer life of system, and no future replacements.

CoolBLUE® cores absorb high frequency common mode currents that destroy bearings, circulating currents, and stray ground currents. Brushes and rings can't claim this.

CoolBLUE® reduces high frequency, too, which increases the impedance of the system.

CoolBLUE® remains in the system forever. Since this is not a mechanical device like a ground ring, it never needs to be replaced, or any type of maintenance.

CoolBLUE® costs the same or less than grounding rings and brushes, and installation takes 10 minutes. CoolBLUE® is the solution to VFD induced bearing damage. CoolBLUE® and NaLA® also resolve circulating currents, and stray grounding currents…issues that cannot be resolved with grounding rings…of any type.

Period!