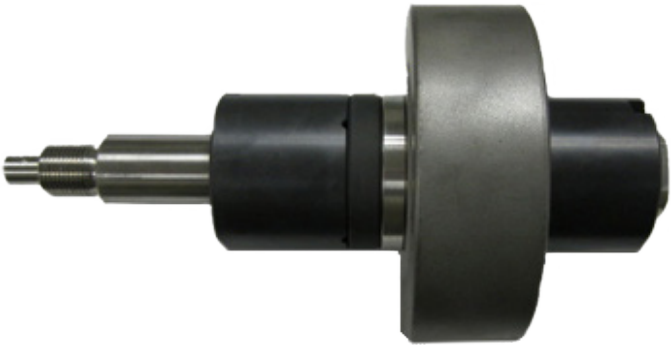
MAGNATEX® Pumps, Inc.

Patented SiC-X℠ Dry Run Resistant Bearings

Significantly increased dry-running capability!

- Our SiC-X bearings can run dry for extended periods — even hours!
- Unique materials and manufacturing techniques of our specially treated SiC-X bearings provide a coefficient of friction 1/4 that of SiC
- The very low coefficient of friction of our SiC-X bearings results in much less heat being generated in upset or dry-running conditions. SiC-X bearings are more forgiving of dry-running conditions frequently encountered at start-up, during upset conditions or in batch services.Extremely hard surfaces minimize wear and prolong service life; resistance to chemicals is maintained for extended bearing life.



SiC-X Availability
MMP/MMH/MML—Standard
MP/ML/MPH/MPT—Standard
MPL/MLL/MHL—Optional
MAXP—Optional

Preliminary Test Results

- In multiple dry-running tests using an MP220, 1 HP unit with standard SiC bearings, noise developed after a brief period of operation. On disassembly, internal damage was identified. The same pump with the special bearing material operated over 1 hour and 45 minutes with no unusual noise. On disassembly, there was no visible damage.
- The next test involved running the same pump with the SiC-X bearing material dry for one hour with the suction valve closed. The rear casing temperature reached 260°F. With the pump still operating, the suction valve was then opened, allowing room temperature water to enter the pump; continued to operate. On inspection, no damage or cracks were observed – all parts were in excellent condition.
- A test at a customer facility was inadvertently run when the suction cap used during shipping was not removed before installation. After running dry for 10 minutes, the pump was inspected and no damage was observed. The pump was reinstalled without the cap and operated as expected.

Test Progression	Standard SiC	Sic-X
	Coefficient of Friction = 0.39	Coefficient of Friction = 0.099
Operation with a combination of air and liquid; rotation speed of 19.7ft/sec and weight on bearing of 8.2 lbs.	The bearing surface was abraded with noticeable wear after operating for 10 minutes	Bearing was in excellent condition after 10 minutes of operation
Dry-running—no liquid; 19.7 ft/sec, 8.2lbs	Bearing damage after 2 seconds of operation	Bearing was in excellent condition after 80 seconds
Dry-running—no liquid; 15.4 ft/sec, 2.2lbs	Bearing damage after 45 seconds of operation	Bearing was still in excellent condition after 1 hour and 45 minutes of operation
Heat shock after dry-running 1 hour; poured water at room temperature on bearing which was assumed over 330°F	N/A—will not run dry this long	Bearing was still in excellent condition; no thermal cracking or heat checking evident

Liquid	Temerature degrees °F	Time	Degrees of Corrosion (g/m2/hr)
65% HNO3	Boiling	24 Hours	0.003
100% H2SO4	Boiling	24 Hours	0.002
35% HCl	Boiling	24 Hours	0.002
30% NaOH	Boiling	24 Hours	0.002
100% CH3COOH	158°F	24 Hours	0.000
35% H2O2	Boiling	24 Hours	0.002

In the case of the test application involving air with liquid, an inherently difficult situation for product lubricated bearings, the SiC-X bearing operated continuously for 10 minutes with no cracks or wear. Even with completely dry operation -- no liquid whatsoever, the SiC-X bearings operated for considerably longer time than SiC bearings. Inspection revealed the bearings to still be in good condition after 1 hour 45 minutes.

Conclusions

- One of the weak points of ceramic materials is poor response to thermal shock. In our tests, the SiC-X bearing material was unaffected. On inspection, the bearing showed no evidence of damage. The results of a similar, though inadvertent, field test where a technician discovered the pump was being operated in a dry-running condition were equally impressive. He stopped the pump and poured liquid on the bearing to cool it off quickly. Even in that situation with the bearing close to the point of being damaged, the SiC-X gave the customer good results. The technician “expected damage” and was surprised to see the SiC-X in good condition.
- As indicated in the corrosion testing chart above, SiC-X had comparable performance to that of SiC as shown in various literature sources for the listed chemicals

Summary

- From our testing and analysis, it is clear that the SiC-X provides good results when used in magnetically-driven pumps, especially for troublesome, startup dry-running conditions. The benefits don’t stop there! We can expect better performance in the case of upset conditions and other temporary dry-running situations, eliminating or greatly delaying bearing damage where it likely would have immediately occurred with standard SiC.
- The values in the above charts are from actual test results and are considered reliable, though we cannot guarantee similar results. For added protection from dry run conditions we recommend the use of a power monitor for optimal equipment protection.

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