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Composite black cylinder tube durability testing with bronze filled Teflon piston wear band and application recommendation.

Setup

A standard Lehigh VAC pneumatic cylinder was assembled with a composite tube to test the tube's durability with the standard piston wear band material and standard lubricant.

The test cylinder was a 12" bore x 12" stroke with a 1-3/8" diameter piston rod. Lehigh part number V12S1200AN0100. The only non-standard part was the composite tube. The standard bronze filled Teflon piston wear band was used as was the standard poly-oil lubricant under the piston wear band. The tie rods were torqued to 100 foot-pounds.

Test Procedure

The cylinder was set to cycle automatically at approximately 1.09 inches per second at 90 psi. The cylinder was anchored to the test table with the piston rod stroking horizontally. After approximately 50,000 cycles (extend and retract), the cylinder would be disassembled and inspected for wear.

Testing

When the actuator reached 50,000 cycles, the test was stopped. The cylinder was checked for air leaks and piston seal by-pass. The breakaway pressure was 1 psi. After disassembly, the tube was found to have only minor scoring on the side of the tube that bore the weight of the piston during the test.

The cylinder was rebuilt with the standard chrome bore steel tube, new seals and lube. The cylinder was put back in test in the same manner as before. After 50,000 cycles the cylinder was disassembled and the wear on the chrome bore steel tube was compared to that of the composite tube. The same minor scoring lines were visible on the "weight bearing" side of the steel tube, but did not penetrate the chrome plate.

Conclusion

Typically the VAC series cylinders are installed in the field vertical rod down, or at a small angle to vertical. They are rarely employed in the horizontal configuration as tested. The test performed simulates the "worst case scenario" to evaluate cylinder performance and durability.

The tests show that the composite tube is compatible with the standard wear band and lubricant. The composite tube wears faster than chrome bore steel.

It is recommended that the composite tubing be applied as a light duty alternative to the standard chrome bore steel where cost is a significant issue. The composite tubing should not be used in heavy side-loading conditions and should be applied when the cylinder can be installed in a vertical position for the longest life.

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