



THE LEE COMPANY

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SUBJECT: IEP Series Solenoid Valve Heritage and Cycle Testing

Heritage:

Over the last 10 years, The Lee Company has supplied over 12,000 IEP Series valves for a wide range of applications, including over 2,700 in 2018. In 2018, IEP Series valves were supplied to at least 20 different customers that develop space systems. Over 1,000 valves were supplied to one customer in the space industry without any valves returned for failure or evaluation. The valve has successfully operated in space since at least 2014.

Report on Cycle testing results for the IEP Series solenoid valve:

5 valves similar in design to IEPA2411241H. (24 volt actuation (38 OHM coil) , EPDM elastomer, 4100 LOHMs) were tested. Four of the five valves were cycled, the fifth was a control which was tested but not cycled.

The test was run on water at 10psig, room temperature, 2ms on time, 100Hz.

Test points were at:

70,000
130,000
250,000
500,000
1,000,000
2,000,000
5,000,000
10,000,000
25,000,000
50,000,000 and at every 50,000,000 cycles after that up to 700,000,000.

At each test point the valves were removed from the water cycle stand and dried by flowing air through the valves.

The valves were tested for:

- First-shot actuation response time at 24 volts, 10 psig air after a minimum of 1 day idle time.
- On and off response times at 24 volts, 10 psig air, 1 Hz actuation frequency.
- Port leakage at 30 psig Helium.
- Flow at 10 psig air.



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Results:

The cycled and the control valves all performed within specifications up to 600,000,000 cycles. At 650,000,000 and 700,000,000 cycles the test valves began to exhibit excessive port leakage. For the purposes of this test the port leakage limit was 1×10^{-4} scc/sec He at 30 psid.