VALVE CLOSED
P = 2000 lb. Pull required to open valve, which includes side and friction and interior friction. Friction due to water pressure and dead weight.

VALVE HORIZONTAL
P = 7000 lb. Pull required to open valve, which includes side and friction and interior friction due to dead weight. N/C weight = 23,000 lb.

VALVE FULLY OPEN
P = 14,000 lb. Pull due to dead weight of valve.

Time required to open valve 6 minutes.