

units, where V is the volume of the spacecraft (T_i = initial temperature), this gives you the time "t" to leak down to p_f in seconds (assuming the cabin gas is air). This assumed that the blow-down was isentropic. In practice, any blow-down that will last tens of seconds to minutes, the process in the spacecraft is more likely to be isothermal: mass of spacecraft has huge thermal capacity compared to the (decreasing) mass of gas inside and will keep the gas warm as it expands. With the assumption of isothermal blow-down, the time required becomes: $t = 0.086 (V/A) \ln[p_i/p_f] / (\text{Sqrt}[T])$ (eqn. 5) where T is the (constant) spacecraft temperature. If the atmosphere inside the spacecraft starts out at room temperature, 293K, this simplifies to: $t = 0.005 (V/A) \ln[p_i/p_f]$ (eqn. 6) A spacecraft with a volume $V=10 \text{ m}^3$