



Life Expectancy

MTBF & L10 life expectancy

The life expectancy of a fan is almost entirely dependent upon the bearing system. In the case of a ball bearing fan an engineer can expect a useful life of 60,000 - 70,000 hours (L10) under normal operating conditions (-40 ~ 50C at 75% RH). As a general rule however the life expectancy will normally increase when the temperature of the environment is cooler.

Many manufacturers will quote a 200,000+/- hour life expectancy by referring to MTBF curves rather than the more common L10 curve. Basically the difference between the two types of curves is the calculated failure rate. L10 specifically refers to the amount of time it takes for 10% of a group of fans to fail during testing. Stated another way: at the end of the specified life expectancy, 90% of a given fan population will still be operating within stated specifications.

MTBF (Mean Time Before Failure) as it relates to the fan industry refers to a 50% failure rate. MTBF curves USUALLY extend into the hundreds-of-thousands of hours for ball bearing fans. (Sleeve bearing fans typically have a life expectancy that is one half of what one would expect from an equivalent ball bearing unit.) ORION FANS typically have a MTBF rating of 250,000 - 300,000 hours

The main problem with MTBF curves in relation to fans is that the calculations were originally designed to project the life expectancy of components that exhibit a RANDOM failure pattern. (In most other components MTBF actually calculates a 63.2% failure rate.) Fans in contrast experience increased frequency of failures as a given fan population ages.

MTBF calculations as provided by most fan manufacturers are actually "L50" calculations. That is to say that at the end of the stated life expectancy at least one half of a given population of fans will have failed.

Life Expectancy Curves are approximations and variations in environment will necessarily affect how long a fan will run. For instance - two identical fans will have vastly different life expectancies if one is run at or near maximum static pressure and the other is run in open air. Each environmental variation will affect lifespan in a positive or negative way.

Also note that the curves assume that a fan will be run 24 hours per day - 7 days per week at a specific temperature. If you instead run a fan for only 8 hours per day you have effectively tripled the life expectancy of your fan in real terms, assuming that you only run the fan at a specific temperature. Also note that "Ball" usually refers to a "Dual ball - double sealed bearing". Single, ball bearing units will have a life expectancy that is somewhere between Dual Ball and Sleeve.