



ARCTIC (H.K.) Ltd

Life Expectancy Report

Representative Test Model : S4028-15K

◎ L₁₀ Expectancy: 50,000 hours minimum @ fan rated voltage and the temperature of 40°C

According to the equation for Weibull distribution, $MTTF \div 7 \times L_{10} = 350,000$ hours

And we rely on a zero failure Weibull test strategy and accelerated testing technique, to determine the total test time (t) for verifying the above life estimation by the equations,

$$t = 1.036 \times MTTF \times [(B_{r,c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

where, (B_{r,c}) is Poisson distribution factor with the failure number of r equal to 0 and the decimal confidence level of c equal to 0.90(90%), and

Stress/Elevated Temperature T _s (°C)	Unstress Temperature T _u (°C)	Acceleration Factor A _F	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B _{r,c}	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF (hours)	Verified L ₁₀ (hours)
75	40	11.31	50	2.303	1,947	2,000.0	359,460	51,351

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2022/3/1 12:00 AM	2022/5/23 12:00 AM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	2000.0

INSPECTION CRITERIA :

- 1.Current (I_{cc}) variation from nominal : +/- 30%
- 2.Rotational Speed variation from nominal : +/- 30%
- 3.Acoustic variation : +/- 3 dBA
- 4.Inspecting external if there is any defects in fan
- 5.Using the lowest voltage to inspect if the fan still operates

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
30	22.63	718,920	102,703
40	11.31	359,460	51,351
50	5.66	179,730	25,676
60	2.83	89,865	12,838
70	1.41	44,932	6,419
80	0.71	22,466	3,209
90	0.35	11,233	1,605

Herewith , we could assume as right on the basis of above test result. Besides, if the actual test time exceed the required, it comes out that those fans' L10 expectancy and MTTF are greater than the warrant.

Time-out for function test or others (hours)	Issued Date	Approved By	Review	Reported By
	5/25/2022			Tony Choi