



ARCTIC (H.K.) Ltd

Life Expectancy Report

Representative Test Model : P9 PWM PST CO

© L₁₀ Expectancy: 30,000 hours minimum @ fan rated voltage and the temperature of 40°C

According to the equation for Weibull distribution, $MTTF \cong 7 \times L_{10} = 210,000$ 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	40	2.303	1,431	1,431.0	209,929	29,990

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2024-9-18 12:00 AM	2024-11-16 3:00 PM	☐ In process	☐ In process (exceed requested)	☒ Termination	1431.0

INSPECTION CRITERIA : 1.Current (Icc) 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	419,858	59,980
		40	11.31	209,929	29,990
		50	5.66	104,964	14,995
		60	2.83	52,482	7,497
		70	1.41	26,241	3,749
		80	0.71	13,121	1,874
		90	0.35	6,560	937
		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	
	2024-11-18			Gaurav Jeandani	