



DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed by Rxx or Fxx series suffixes. This test report applies to BFB 75x25mm series as the right table

Representative Test P/N: BFB0712HHD77

Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D

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

According to the equation for **Weibull distribution**, **MTTF 7xL10 = 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,

$$t = 1.036 \times \text{MTTF} \times [(\text{Br};c) / n]^{0.91} / \text{AF}, \text{ and } \text{AF} = 2^{(T_s - T_u) / 10}$$

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%).

Stress/Elevated Temperature T _s (°C) (Actual Test Temperature)	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 40°C (hours)	Verified L10 40°C (hours)
85	40	22.63	30	2.303	1,550	12,525	2,828,432	404,062

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
25-Apr-19	7-Apr-20	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	12,525

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. (MTTF: means Mean Time To Failures, it should be used in a non-repairable system setting. Now we show the MTTF in our life report, that's because we will not repair the failed fans during life experiment. MTBF: means Mean Time Between failures, it should be used in a repairable system setting).

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L10 (hours)
25	64.00	8,000,015	1,142,859
30	45.25	5,656,865	808,124
40	22.63	2,828,432	404,062
50	11.31	1,414,216	202,031
60	5.66	707,108	101,015
70	2.83	353,554	50,508
85	1.00	125,000	17,857
Test Result		<input checked="" type="checkbox"/> Accept	<input type="checkbox"/> Reject

Fan acceptance criteria for the measurements after test :

- Speed can not decrease ≥ 15% below the original measured RPM.
- Current cannot increase > 15% over original measure current.
- Noise cannot increase >3dB over the original measured noise.

QE File No.	Time-out for function test or others (hours)	Date of issue	Reported By	Approved By
TH19FNL015	1,347	23-Nov-20	Natthichakorn	Niranam



DC FAN FUNCTION TEST RECORD FOR CUSTOMIZED LIFE EXPERIMENT

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Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
1,550	25-Apr-19	7-Apr-20	30	0	12,525
Representative Test P/N: BFB0712HHD77			Current Test Status	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested) <input checked="" type="checkbox"/> Termination
Equipment: 1.Oven: F00-5, E24-T060 2. DC Source: GW GPC-3060D					

Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation Max (%)	Initial Test	Final Test	Deviation Max (%)	Initial Test	Final Test	Deviation Max (dB)
	Current Spec. Max (A)	Current Spec. Max (A)		Speed Spec. REF (RPM)	Speed Spec. REF (RPM)		Noise at 1 m Max (dB A)	Noise at 1 m Max (dB A)	
	0.68	0.68	15	5500	5500	-15	53.5	53.5	3
1	0.49	0.49	-1.0	5554	5608	1.0	52.6	52.4	-0.2
2	0.48	0.46	-4.2	5467	5672	3.7	52.4	52.3	-0.1
3	0.49	0.47	-5.5	5470	5725	4.7	52.5	52.5	0.0
4	0.49	0.48	-2.6	5586	5708	2.2	52.3	52.1	-0.2
5	0.48	0.45	-5.2	5531	5508	-0.4	52.4	52.3	-0.1
6	0.48	0.47	-2.9	5554	5595	0.7	52.5	52.5	0.0
7	0.47	0.48	0.4	5540	5580	0.7	52.6	52.4	-0.2
8	0.49	0.48	-0.8	5509	5594	1.5	52.3	52.6	0.3
9	0.48	0.46	-3.9	5544	5668	2.2	52.5	52.1	-0.4
10	0.46	0.46	-1.5	5484	5591	2.0	52.6	52.2	-0.4
11	0.48	0.48	0.4	5499	5558	1.1	52.5	52.3	-0.2
12	0.49	0.48	-2.3	5481	5506	0.5	52.4	52.7	0.3
13	0.48	0.48	0.2	5415	5465	0.9	52.5	52.3	-0.2
14	0.48	0.45	-6.7	5416	5494	1.4	52.4	52.6	0.2
15	0.47	0.47	-1.1	5429	5490	1.1	52.5	52.8	0.3
16	0.49	0.47	-3.5	5530	5742	3.8	52.6	52.4	-0.2
17	0.48	0.46	-4.2	5449	5497	0.9	52.4	52.5	0.1
18	0.49	0.47	-3.1	5377	5487	2.0	52.5	52.3	-0.2
19	0.49	0.47	-3.9	5499	5754	4.6	52.6	52.5	-0.1
20	0.48	0.48	0.2	5464	5626	3.0	52.2	52.1	-0.1
21	0.47	0.47	0.0	5329	5440	2.1	52.3	52.6	0.3
22	0.48	0.47	-2.5	5492	5629	2.5	52.6	52.3	-0.3
23	0.49	0.49	0.4	5493	5495	0.0	52.3	52.5	0.2
24	0.48	0.48	0.6	5493	5476	-0.3	52.4	52.3	-0.1
25	0.48	0.47	-1.9	5472	5567	1.7	52.2	52.6	0.4
26	0.49	0.48	-1.8	5580	5489	-1.6	52.4	52.4	0.0
27	0.47	0.47	0.2	5468	5486	0.3	52.3	52.3	0.0
28	0.46	0.46	-0.9	5417	5475	1.1	52.4	52.5	0.1
29	0.50	0.48	-3.4	5410	5535	2.3	52.3	52.6	0.3
30	0.49	0.49	-1.2	5451	5525	1.4	52.4	52.0	-0.4
X-bar	0.48	0.47	-	5480	5566	-	52.4	52.4	-
σ	0.01	0.01	-	60	90	-	0.1	0.2	-

QE File No.	Time-out for function test or others (hours)	Date of issue	Reported By	Approved By
TH19FNL015	1,347	23-Nov-20	Natthichakorn	Niranam