

SOFASCO INC

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DC FAN LIFE TEST REPORT

Available for these models with lower speed and same physical structure. This report applies to models as the below table.

DB5015V24Y	-	-
-	-	-
-	-	-
Y may be H or lower speed		

Representative test model : **DB5015V24H**

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Date : 2008/01/10

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Date : 2008/01/10

Approved By : Guo WeiCheng

Date : 2008/01/10

FORMULA AND PARAMETER

1. L_{10} Expectancy : 70,000 hrs. minimum @fan rated voltage and temperature of 40°C.

2. Formula According to the method of Weibull distribution, $MTTF \cong 7 \times L_{10} =$ 490,000 hrs.

Base on a safety coefficient --- 1.3 times, the target time of L_{10} is 91,000 hrs.

And the target time of MTTF is 637,000 hrs.

We depend 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 equation,

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

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%).

Sample size (n) : 50 pcs.

Acceleration factor (A_F) : 16

Stress temperature (T_s) : 80 °C

Unstress temperature (T_u) : 40 °C

Poisson distribution factor ($B_{r;c}$) : 2.3026

We get required test time with zero failure = 2,506 hrs.

3. Parameter :
1. For current, the limit is less than spec. (max.).
 2. For speed, the acceptable decrease is no more than initial +15%.
 3. For noise, the limit is no more than spec. +15%.

4. Test Date :

1. Date of test start 2007/9/26 10:00
2. Date of test termination (Estimated) : 2008/1/8 20:00
3. Date of test termination (Actual) : 2008/1/9 10:00

✘ If the actual test time exceed the required, it comes out that those fans' life expectancy and MTTF are greater than warrant.

5. Test Equipments :

1. Thermostated container : D060
2. DC power supply : CPS-6060D

RESULT

1. Current Test Status :

▶ Customer Request

▶ New Product

▶ Component Change

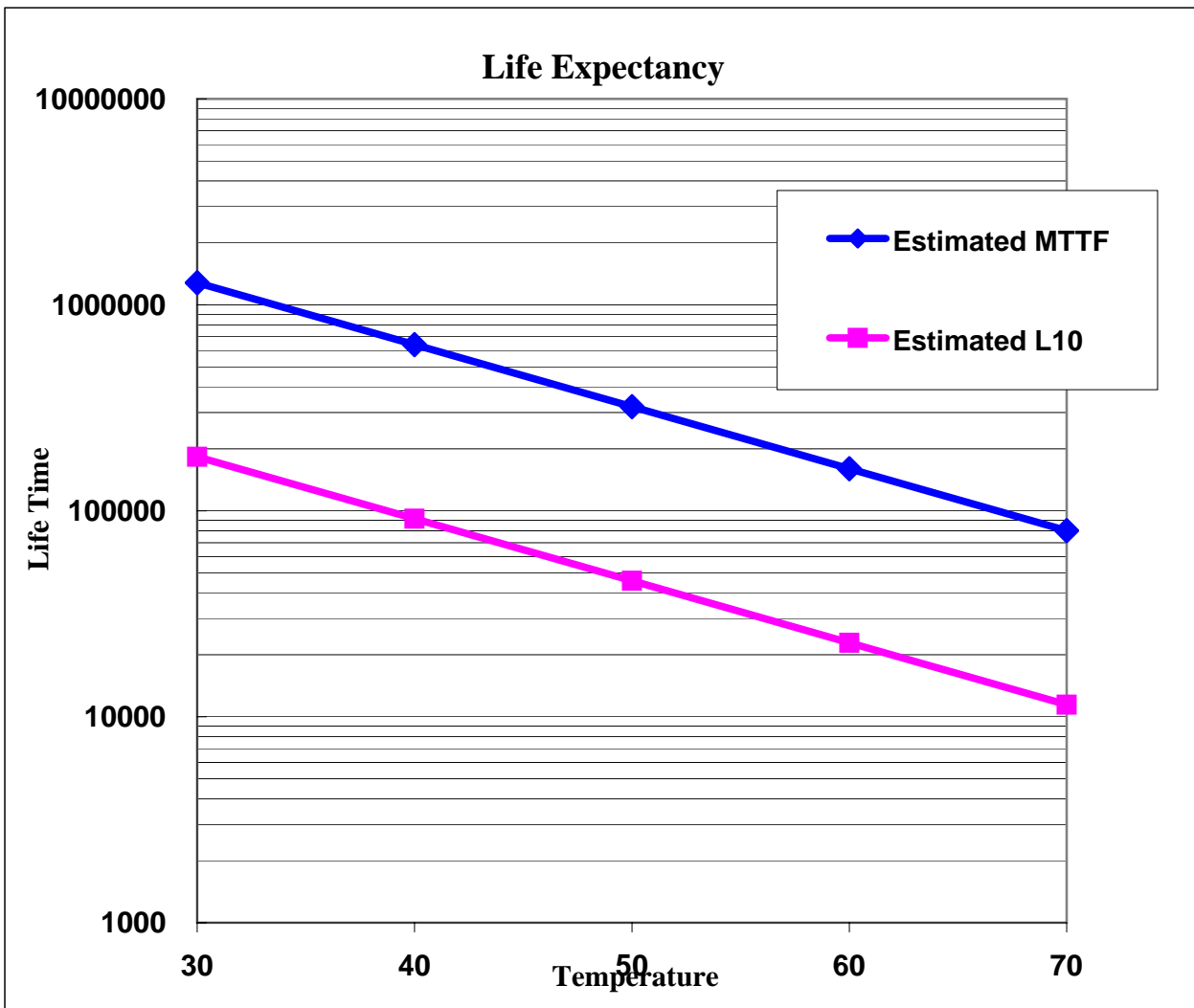
▶ Routine Test

1. Actual Test Hours : 2,520 hrs.

2. Verified MTTF : 640,626 hrs.

3. Verified L_{10} : 91,518 hrs.

Temperature Value	25	30	40	50	60	70
A_F	45.25	32	16	8	4	2
Estimated MTTF	1811964	1281252	640626	320313	160157	80079
Estimated L_{10}	258852	183036	91518	45759	22880	11440



BEFORE TEST

Sample No.	Current Spec.		Deviation	Speed Spec.		Deviation	Noise Spec.		Deviation
	0.25 Max.	0.25 Max.	%	7500 Ref.	6375 Min.	%	49.9 dBA	57.4 dBA	%
	Initial	Final		Initial	Final		Initial	Final	
1	0.14	0.14	0.0%	7448	7259	-2.5%	48.1	48.2	0.1
2	0.14	0.14	0.0%	7485	7447	-0.5%	48.8	49.4	0.6
3	0.14	0.13	-7.1%	7466	7308	-2.1%	48.8	49.0	0.2
4	0.14	0.14	0.0%	7409	7367	-0.6%	48.7	49.2	0.5
5	0.14	0.14	0.0%	7473	7380	-1.2%	48.6	49.0	0.4
6	0.14	0.14	0.0%	7442	7246	-2.6%	48.0	48.1	0.1
7	0.14	0.14	0.0%	7407	7301	-1.4%	48.4	48.8	0.4
8	0.14	0.14	0.0%	7450	7546	1.3%	47.7	48.6	0.9
9	0.14	0.13	-7.1%	7515	7566	0.7%	47.6	48.4	0.8
10	0.14	0.13	-7.1%	7455	7644	2.5%	48.5	49.7	1.2
11	0.14	0.14	0.0%	7444	7358	-1.2%	47.7	48.1	0.4
12	0.14	0.14	0.0%	7486	7401	-1.1%	48.5	48.9	0.4
13	0.14	0.14	0.0%	7390	7620	3.1%	47.4	48.7	1.3
14	0.14	0.14	0.0%	7405	7172	-3.1%	48.2	48.2	0.0
15	0.14	0.14	0.0%	7470	7706	3.2%	48.8	50.1	1.3
16	0.14	0.14	0.0%	7501	7508	0.1%	48.0	48.7	0.7
17	0.14	0.13	-7.1%	7399	7309	-1.2%	48.1	48.5	0.4
18	0.14	0.14	0.0%	7411	7367	-0.6%	48.0	48.5	0.5
19	0.13	0.13	0.0%	7406	7706	4.1%	47.5	49.0	1.5
20	0.14	0.13	-7.1%	7446	7623	2.4%	48.1	49.3	1.2
21	0.14	0.13	-7.1%	7496	7583	1.2%	47.8	48.7	0.9
22	0.14	0.14	0.0%	7389	7194	-2.6%	47.9	48.0	0.1
23	0.15	0.14	-6.7%	7424	7361	-0.8%	48.4	48.9	0.5
24	0.13	0.14	7.7%	7518	7727	2.8%	48.2	49.5	1.3
25	0.14	0.14	0.0%	7524	7192	-4.4%	48.2	47.9	-0.3
26	0.14	0.13	-7.1%	7397	7567	2.3%	48.1	49.3	1.2
27	0.14	0.13	-7.1%	7496	7315	-2.4%	47.5	47.6	0.1
28	0.15	0.14	-6.7%	7414	7246	-2.3%	48.6	48.8	0.2

BEFORE TEST

Sample No.	Current Spec.		Deviation	Speed Spec.		Deviation	Noise Spec.		Deviation
	0.25 Max.	0.25 Max.	%	7500 Ref.	6375 Min.	%	49.9 dBA	57.4 dBA	%
	Initial	Final		Initial	Final		Initial	Final	
29	0.14	0.14	0.0%	7503	7354	-2.0%	48.7	48.9	0.2
30	0.15	0.14	-6.7%	7476	7507	0.4%	47.7	48.4	0.7
31	0.14	0.13	-7.1%	7447	7704	3.5%	48.0	49.4	1.4
32	0.13	0.14	7.7%	7533	7700	2.2%	47.6	48.7	1.1
33	0.14	0.14	0.0%	7512	7566	0.7%	48.4	49.2	0.8
34	0.14	0.14	0.0%	7462	7458	-0.1%	48.0	48.6	0.6
35	0.13	0.13	0.0%	7531	7326	-2.7%	47.8	47.9	0.1
36	0.14	0.14	0.0%	7386	7381	-0.1%	47.6	48.2	0.6
37	0.14	0.14	0.0%	7423	7465	0.6%	47.6	48.4	0.8
38	0.14	0.14	0.0%	7413	7185	-3.1%	48.1	48.1	0.0
39	0.14	0.14	0.0%	7515	7577	0.8%	48.7	49.5	0.8
40	0.14	0.14	0.0%	7527	7668	1.9%	48.1	49.2	1.1
41	0.14	0.13	-7.1%	7383	7668	3.9%	48.3	49.8	1.5
42	0.14	0.14	0.0%	7431	7612	2.4%	47.8	49.0	1.2
43	0.14	0.14	0.0%	7476	7174	-4.0%	47.7	47.5	-0.2
44	0.14	0.13	-7.1%	7449	7488	0.5%	48.7	49.5	0.8
45	0.14	0.14	0.0%	7400	7657	3.5%	48.3	49.7	1.4
46	0.14	0.14	0.0%	7485	7281	-2.7%	48.5	48.6	0.1
47	0.14	0.13	-7.1%	7411	7597	2.5%	48.4	49.6	1.2
48	0.14	0.14	0.0%	7419	7355	-0.9%	48.2	48.7	0.5
49	0.14	0.14	0.0%	7432	7211	-3.0%	47.9	47.9	0.0
50	0.14	0.13	-7.1%	7471	7524	0.7%	47.8	48.6	0.8
Max.	0.15	0.14	7.7%	7533	7727	4.1%	48.8	50.1	1.5
Min.	0.13	0.13	-7.1%	7383	7172	-4.4%	47.4	47.5	-0.3
\bar{x}	0.14	0.14		7453.0	7449.5		48.1	48.8	
σ	0.004	0.005		44.7	171.0		0.40	0.60	