

# SOFASCO INC.

## MTTF REPORT

<b>MODEL NO:</b> DF30198V24				
<b>BEARING</b>	<b>VOLTAGE(V)</b>	<b>CURRENT(A)</b>	<b>SPEED(RPM)</b>	<b>TEST VOLTAGE(V)</b>
BALL BEARING	24	0.16	2900	24
<b>TESTED QTY/PCS</b>	<b>TEST HRS/EA</b>		<b>TOTAL HRS</b>	<b>TEST TEMPERATURE/ °C</b>
45	1500		67500	70

1. According to the equation of product accumulation failure rate,

$\odot 10\% = 1 - e^{-\lambda t}$      
  $\odot t \rightarrow L_{10}$      
  $\odot L_{10} = 0.10536/\lambda$      
  $\odot MTTF = 1/\lambda$

$\odot MTTF/L_{10} = (1/\lambda) / (0.10536/\lambda) \approx 9.5$      
 So we get the result,  $MTTF \approx 9.5 * L_{10}$

2. According to the equation for Arrhenius Model

$$A_F = e^{(\Delta H/KT)} = e^{\{(\Delta H/K) \times [(1/T_u) - (1/T_s)]\}}$$

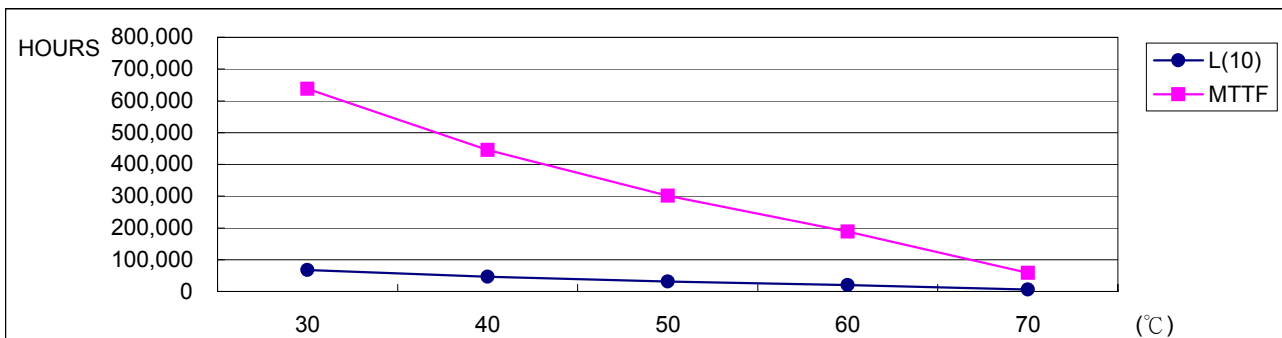
where,  $A_F$  is acceleration factor,  $e$  is natural logarithm (2.713),  $\Delta H$  is activation energy,

$K$  is Boltzmann's constant ( $8.623 \times 10^{-5}$  eV/°K),  $T$  is absolute temperature (°K),

$T_u$  is unstress temperature (°K),  $T_s$  is stress temperature (°K), and the confidence level is equal to 0.90 (90%)

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. Basically, MTBF is equal to MTTF, they use same formula to work out a life data.)

Temperature For MTTF Estimation (°C)	Acceleration Factor $A_F$	Estimated MTTF(hours)	Estimated $L_{10}$ (hours)
30	10.83	637,346	67,089
40	7.56	444,906	46,832
50	5.12	301,312	31,717
60	3.21	188,909	19,885
70	1	58,850	6,195



<b>APPROVED BY</b>	<b>ISSUED DATE</b>	<b>CHECKED BY</b>	<b>PREPARED BY</b>
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