

# REPORTS

## Reliability evaluation of optical disks

Application Company : Mitsubishi Kagaku Media Co., Ltd.  
Sample name : Enterprise Grade BD-R DL 50GB.  
Application date : 7<sup>th</sup> April, 2015.

Archive Disc Test Center – NPO Entity

7<sup>th</sup> April, 2015

1 Accelerated-aging test methods

1-1 Number and title of the standard

Number: ISO/IEC 16963:2015

Title: "Information technology – Digitally recorded media for information interchange and storage – Test method for the estimation of lifetime of optical disks for long-term data storage."

1-2 Ambient storage condition for the lifetime estimation

Controlled storage-condition: 25°C/50%RH

1-3 Stress and testing condition

Basic stress-condition testing.

1-4 The recording speed used for testing shall be reported

Quad-speed.

1-5 Sample information

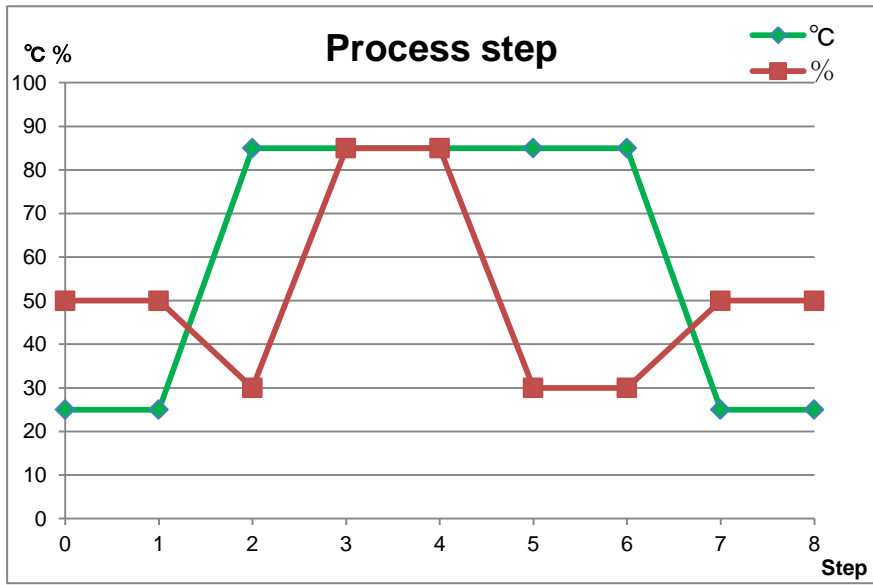
[Table 1-5-1]

Test specimen group	Stress condition (Incubation)		Number of specimens	Total incubation subinterval time	Total incubation time	Intermediate RH	Equilibration duration time
	Temp. (°C)	%RH					
<b>A</b>	<b>80</b>	<b>80</b>	<b>20</b>	<b>250</b>	<b>1000</b>	<b>30</b>	<b>14</b>
<b>B</b>	<b>80</b>	<b>70</b>	<b>20</b>	<b>250</b>	<b>1000</b>	<b>30</b>	<b>12</b>
<b>C</b>	<b>65</b>	<b>80</b>	<b>20</b>	<b>500</b>	<b>2000</b>	<b>35</b>	<b>18</b>
<b>D</b>	<b>70</b>	<b>75</b>	<b>30</b>	<b>625</b>	<b>2500</b>	<b>33</b>	<b>22</b>

1-6 Incubation and ramp profiles

[Table 1-6-1] Transition profiles

	Step 0	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
<b>Process</b>	Start	T,RH ramp	RH ramp	Incubation	RH ramp	Equilibration	T,RH ramp	End
<b>Time</b>	<b>2 h</b>	<b>2 h</b>	<b>5 h</b>	<b>Table1-5-1</b>	<b>5 h</b>	<b>Table1-5-1</b>	<b>2 h</b>	<b>120 h</b>



[Figure 1-6-1] Transition profiles

2 Time-to-failure data

2-1 The measured data-errors

[Table 2-1-1] - [Table 2-1-4] show the initial data-errors measured prior to accelerated aging plus the data-errors measured after each specified accelerated aging incubation sub-interval.

[Table 2-1-1] 80°C/80%RH

[Table 2-1-2] 80°C/70%RH

80°C/80%RH								80°C/70%RH							
No.	Layer	[mm]	0 h	250 h	500 h	750 h	1000 h	No.	Layer	[mm]	0 h	250 h	500 h	750 h	1000 h
A-1	L0	25	1.69E-05	2.98E-05	3.72E-05	1.67E-04	1.35E-04	B-1	L0	25	1.07E-05	2.16E-05	2.71E-05	5.39E-05	4.35E-05
		40	1.58E-05	3.29E-05	4.74E-05	5.16E-05	5.40E-05			40	1.32E-05	6.38E-05	3.43E-05	2.44E-05	4.62E-05
		55	1.62E-05	8.82E-05	9.35E-05	5.61E-05	4.45E-05			55	7.80E-06	1.21E-03	1.32E-04	1.78E-05	1.99E-05
	L1	25	6.72E-06	2.40E-05	3.13E-05	2.35E-04	2.35E-04		L1	25	1.92E-06	2.23E-06	1.32E-05	2.64E-05	3.59E-05
		40	1.87E-06	1.81E-05	3.32E-05	5.61E-05	1.18E-04			40	1.38E-06	1.75E-06	5.83E-06	1.95E-06	1.54E-05
		55	2.11E-06	2.02E-05	3.63E-05	5.21E-05	1.16E-04			55	1.76E-06	3.02E-06	3.31E-06	3.77E-06	4.92E-06
A-2	L0	25	1.42E-05	3.64E-05	4.05E-05	4.48E-05	4.80E-05	B-2	L0	25	1.73E-05	3.42E-05	3.01E-05	3.34E-05	3.71E-05
		40	1.46E-05	4.31E-05	4.04E-05	4.13E-05	4.76E-05			40	1.46E-05	4.84E-05	4.28E-05	4.68E-05	3.45E-05
		55	8.28E-06	1.25E-04	5.19E-05	3.55E-05	3.90E-05			55	8.20E-06	7.46E-04	6.65E-04	3.28E-05	3.51E-05
	L1	25	1.38E-06	9.16E-06	1.31E-05	2.28E-05	1.08E-04		L1	25	3.97E-06	1.31E-05	8.55E-06	1.00E-05	1.04E-05
		40	1.32E-06	4.48E-06	5.76E-06	2.99E-05	3.33E-04			40	2.32E-06	3.58E-06	6.74E-06	2.26E-05	8.61E-06
		55	2.17E-06	1.20E-05	5.11E-06	2.81E-05	3.55E-04			55	2.94E-06	5.84E-06	1.51E-05	1.84E-05	2.26E-05
A-3	L0	25	7.05E-06	1.40E-05	1.43E-05	1.43E-05	1.88E-05	B-3	L0	25	1.86E-05	3.18E-05	3.44E-05	4.44E-05	4.65E-05
		40	8.72E-06	2.36E-05	2.69E-05	2.61E-05	3.51E-05			40	2.04E-05	5.97E-05	6.80E-05	4.73E-05	5.24E-05
		55	6.38E-06	1.78E-04	5.05E-05	2.34E-05	2.27E-05			55	1.04E-05	1.02E-03	1.25E-03	2.88E-05	3.17E-05
	L1	25	2.25E-06	8.20E-06	1.14E-05	2.40E-05	8.67E-05		L1	25	1.63E-06	3.42E-06	5.09E-06	4.96E-06	8.45E-06
		40	2.50E-06	6.34E-06	1.27E-05	3.64E-05	1.37E-04			40	1.10E-06	3.10E-06	3.76E-06	4.53E-06	5.77E-06
		55	1.70E-06	9.88E-06	1.85E-05	5.18E-05	2.33E-04			55	1.37E-06	6.13E-06	1.10E-05	1.23E-05	1.67E-05
A-4	L0	25	1.36E-05	2.59E-05	2.80E-05	3.23E-05	3.77E-05	B-4	L0	25	1.86E-05	2.53E-05	2.68E-05	2.84E-05	3.11E-05
		40	9.75E-06	2.56E-05	3.31E-05	2.59E-05	3.02E-05			40	2.04E-05	6.91E-05	6.39E-05	4.92E-05	5.21E-05
		55	1.20E-05	9.66E-05	7.08E-05	4.23E-05	3.76E-05			55	1.04E-05	1.01E-03	2.10E-03	2.45E-05	2.54E-05
	L1	25	3.66E-06	5.74E-06	8.27E-06	2.09E-05	1.77E-04		L1	25	1.63E-06	6.77E-06	7.72E-06	9.89E-06	1.13E-05
		40	1.56E-06	2.23E-06	1.53E-05	2.68E-05	2.43E-04			40	1.10E-06	1.88E-05	2.19E-05	3.04E-05	2.90E-05
		55	5.93E-06	8.11E-06	2.32E-05	4.16E-05	2.03E-04			55	1.37E-06	1.51E-05	1.92E-05	1.71E-05	1.69E-05
A-5	L0	25	1.57E-05	3.82E-05	3.51E-05	4.38E-05	4.55E-05	B-5	L0	25	1.05E-05	3.20E-05	2.76E-05	3.45E-05	3.53E-05
		40	1.94E-05	6.19E-05	5.05E-05	4.60E-05	5.59E-05			40	1.79E-05	8.90E-05	6.90E-05	4.62E-05	4.93E-05
		55	9.29E-06	4.83E-04	9.23E-05	3.95E-05	3.67E-05			55	9.53E-06	1.11E-03	1.22E-03	2.81E-05	2.80E-05
	L1	25	4.90E-06	2.41E-05	1.51E-05	2.66E-05	7.47E-05		L1	25	1.49E-06	3.19E-06	3.31E-06	9.23E-06	8.85E-06
		40	2.05E-06	5.68E-06	6.70E-06	2.15E-05	1.02E-04			40	1.43E-06	6.07E-06	7.62E-06	8.18E-06	6.21E-06
		55	1.85E-06	1.40E-05	1.77E-05	3.49E-05	1.18E-04			55	1.47E-06	9.46E-06	9.29E-06	9.79E-06	9.14E-06
A-6	L0	25	2.08E-05	4.90E-05	4.73E-05	5.08E-05	5.77E-05	B-6	L0	25	1.12E-05	2.73E-05	2.54E-05	2.46E-05	2.57E-05
		40	2.40E-05	9.53E-05	5.36E-05	5.47E-05	5.51E-05			40	1.43E-05	5.49E-05	5.32E-05	2.77E-05	3.40E-05
		55	1.20E-05	5.41E-04	1.25E-04	6.02E-05	5.94E-05			55	9.47E-06	1.09E-03	2.32E-03	1.84E-05	2.06E-05
	L1	25	5.56E-06	2.22E-05	1.90E-05	3.19E-05	7.44E-05		L1	25	2.29E-06	1.04E-05	1.31E-05	1.00E-05	6.92E-06
		40	1.68E-06	4.66E-05	1.52E-05	2.76E-05	9.42E-05			40	1.36E-06	4.26E-06	9.17E-06	9.07E-06	1.31E-05
		55	2.57E-06	1.24E-05	3.25E-05	4.48E-05	1.25E-04			55	1.65E-06	5.82E-06	9.21E-06	7.18E-06	5.86E-06
A-7	L0	25	1.41E-05	3.05E-05	3.71E-05	3.96E-05	4.98E-05	B-7	L0	25	1.34E-05	3.76E-05	4.67E-05	3.93E-05	5.30E-05
		40	2.29E-05	6.80E-05	5.43E-05	4.79E-05	6.09E-05			40	1.44E-05	8.65E-05	1.04E-04	4.42E-05	4.96E-05
		55	1.27E-05	6.04E-04	1.25E-04	3.68E-05	4.24E-05			55	6.83E-06	1.56E-03	1.80E-03	2.94E-05	3.27E-05
	L1	25	1.32E-06	1.93E-06	7.14E-06	1.20E-05	1.24E-04		L1	25	2.85E-06	8.77E-06	1.75E-05	1.70E-05	1.79E-05

		40	1.45E-06	2.01E-06	4.83E-06	1.93E-05	1.63E-04			40	1.54E-06	2.44E-06	2.98E-06	2.54E-06	2.59E-06
		55	1.29E-06	1.51E-05	2.11E-05	3.57E-05	2.49E-04			55	1.98E-06	1.83E-05	1.06E-05	7.60E-06	8.97E-06
A-8	L0	25	5.26E-06	3.07E-05	3.53E-05	3.96E-05	3.56E-05	B-8	L0	25	5.40E-06	2.31E-05	2.52E-05	2.54E-05	2.64E-05
		40	3.83E-06	2.57E-05	2.73E-05	4.79E-05	1.99E-05			40	3.80E-06	2.65E-05	3.40E-05	1.81E-05	1.84E-05
		55	8.82E-06	5.58E-04	5.73E-05	3.68E-05	2.76E-05			55	2.29E-06	4.20E-04	7.76E-04	1.96E-05	2.15E-05
	L1	25	1.92E-06	3.50E-05	2.61E-05	1.20E-05	2.92E-05		L1	25	1.60E-05	2.55E-05	2.59E-05	2.40E-05	2.25E-05
		40	1.26E-06	1.61E-05	2.18E-05	1.93E-05	1.98E-05			40	1.49E-05	1.71E-05	2.37E-05	2.45E-05	2.30E-05
		55	8.84E-06	3.16E-05	4.09E-05	3.57E-05	4.87E-05			55	1.63E-05	2.25E-05	2.91E-05	2.67E-05	3.06E-05
A-9	L0	25	1.62E-05	2.79E-05	5.07E-05	4.87E-05	5.03E-05	B-9	L0	25	8.91E-06	2.60E-05	3.31E-05	3.29E-05	3.86E-05
		40	8.91E-06	2.00E-05	2.07E-05	1.93E-05	2.52E-05			40	9.19E-06	3.06E-05	3.18E-05	2.50E-05	2.52E-05
		55	6.95E-06	1.48E-04	4.25E-05	2.71E-05	2.78E-05			55	4.50E-06	9.15E-04	9.69E-04	1.90E-05	2.01E-05
	L1	25	3.95E-06	4.76E-06	2.61E-05	2.56E-05	2.97E-05		L1	25	1.91E-06	6.30E-06	8.58E-06	6.29E-06	1.10E-05
		40	1.38E-06	2.13E-06	4.98E-06	5.06E-06	1.46E-05			40	3.10E-06	3.79E-06	5.69E-06	6.59E-06	7.31E-06
		55	1.34E-06	1.02E-05	1.44E-05	1.41E-05	2.22E-05			55	1.35E-06	5.00E-06	6.07E-06	4.32E-06	3.22E-06
A-10	L0	25	1.23E-05	2.71E-05	3.40E-05	3.49E-05	3.91E-05	B-10	L0	25	8.36E-06	2.00E-05	3.38E-05	3.36E-05	3.48E-05
		40	9.28E-06	2.32E-05	2.77E-05	2.65E-05	2.73E-05			40	7.61E-06	3.03E-05	3.39E-05	1.71E-05	1.82E-05
		55	1.01E-05	1.08E-04	6.25E-05	3.58E-05	3.86E-05			55	3.56E-06	1.05E-03	9.99E-04	2.46E-05	2.49E-05
	L1	25	2.50E-06	2.69E-06	5.08E-06	5.74E-06	1.37E-05		L1	25	1.94E-06	2.45E-06	1.28E-05	1.07E-05	9.87E-06
		40	1.23E-06	7.16E-06	1.35E-05	1.27E-05	1.79E-05			40	1.22E-06	4.14E-06	2.96E-06	2.73E-06	2.63E-06
		55	5.15E-06	1.77E-05	2.22E-05	2.04E-05	2.73E-05			55	1.20E-06	1.65E-05	1.87E-05	1.58E-05	1.57E-05
A-11	L0	25	4.12E-06	1.21E-05	1.66E-05	1.79E-05	2.07E-05	B-11	L0	25	7.37E-06	1.51E-05	1.85E-05	1.85E-05	2.02E-05
		40	3.06E-06	1.42E-05	1.46E-05	1.34E-05	1.48E-05			40	3.12E-06	1.55E-05	1.54E-05	8.20E-06	1.27E-05
		55	2.22E-06	4.24E-04	3.62E-05	1.63E-05	1.78E-05			55	4.26E-06	6.54E-04	4.14E-04	2.19E-05	2.15E-05
	L1	25	1.82E-06	5.03E-06	6.93E-06	9.44E-06	1.32E-05		L1	25	3.83E-06	7.10E-06	1.22E-05	1.06E-05	1.49E-05
		40	1.51E-06	3.67E-06	4.68E-06	5.23E-06	8.98E-06			40	1.18E-06	1.63E-06	1.96E-06	2.06E-06	8.15E-06
		55	1.60E-06	1.13E-05	1.99E-05	2.10E-05	2.23E-05			55	2.60E-06	4.33E-06	5.06E-06	8.28E-06	9.65E-06
A-12	L0	25	3.89E-06	1.20E-05	2.19E-05	2.28E-05	2.73E-05	B-12	L0	25	6.90E-06	2.45E-05	3.04E-05	3.08E-05	3.53E-05
		40	3.99E-06	1.60E-05	1.51E-05	1.43E-05	1.42E-05			40	4.06E-06	2.76E-05	3.37E-05	2.13E-05	2.22E-05
		55	2.24E-06	1.33E-03	3.26E-05	1.23E-05	1.38E-05			55	4.14E-06	1.16E-03	5.71E-04	2.09E-05	2.21E-05
	L1	25	1.73E-06	2.19E-06	1.31E-05	1.49E-05	2.30E-05		L1	25	2.04E-06	9.56E-06	1.08E-05	1.09E-05	1.41E-05
		40	1.78E-06	4.33E-06	5.46E-06	9.16E-06	1.64E-05			40	1.36E-06	8.38E-06	1.35E-05	9.53E-06	9.24E-06
		55	1.36E-06	9.49E-06	7.76E-06	8.94E-06	2.53E-05			55	1.28E-06	1.98E-05	1.76E-05	9.80E-06	1.26E-05
A-13	L0	25	9.39E-06	2.09E-05	2.71E-05	2.88E-05	3.23E-05	B-13	L0	25	5.14E-06	1.56E-05	1.63E-05	1.92E-05	1.82E-05
		40	5.87E-06	2.19E-05	1.82E-05	1.73E-05	1.84E-05			40	4.52E-06	1.61E-05	2.30E-05	1.83E-05	1.74E-05
		55	3.61E-06	1.15E-03	3.87E-05	1.66E-05	2.37E-05			55	2.85E-06	1.87E-05	3.87E-04	1.94E-05	1.41E-05
	L1	25	8.46E-06	1.46E-05	1.80E-05	1.84E-05	2.30E-05		L1	25	1.84E-06	7.10E-06	5.93E-06	8.46E-06	8.57E-06
		40	2.82E-06	3.74E-06	7.80E-06	8.10E-06	1.33E-05			40	1.59E-06	1.10E-05	1.31E-05	1.45E-05	1.39E-05
		55	2.30E-06	1.55E-05	1.00E-05	1.36E-05	2.78E-05			55	1.41E-06	2.39E-06	1.49E-05	1.70E-05	6.04E-06
A-14	L0	25	1.11E-05	3.00E-05	3.39E-05	3.35E-05	3.53E-05	B-14	L0	25	1.12E-05	2.84E-05	2.02E-05	2.14E-05	2.27E-05
		40	7.36E-06	2.48E-05	2.21E-05	2.02E-05	2.15E-05			40	4.06E-06	1.06E-05	1.17E-05	8.21E-06	8.87E-06
		55	8.82E-06	6.37E-04	4.88E-05	3.73E-05	3.76E-05			55	3.94E-06	1.34E-05	1.79E-04	2.09E-05	2.36E-05
	L1	25	2.79E-06	1.10E-05	1.19E-05	1.09E-05	1.28E-05		L1	25	6.73E-06	2.48E-05	1.24E-05	1.31E-05	1.49E-05
		40	1.57E-06	5.15E-06	9.66E-06	8.83E-06	1.45E-05			40	1.06E-06	4.41E-06	2.57E-06	1.56E-06	1.45E-06
		55	1.55E-06	4.09E-06	1.78E-05	2.81E-05	3.74E-05			55	1.53E-06	1.03E-05	1.61E-05	1.43E-05	1.89E-05
A-15	L0	25	1.29E-05	2.33E-05	2.71E-05	2.78E-05	3.18E-05	B-15	L0	25	9.83E-06	1.51E-05	2.13E-05	1.94E-05	2.30E-05
		40	7.94E-06	2.79E-05	2.28E-05	1.96E-05	2.72E-05			40	5.69E-06	8.72E-06	1.24E-05	1.06E-05	1.31E-05
		55	1.03E-05	1.13E-03	5.61E-05	2.56E-05	2.98E-05			55	4.47E-06	1.58E-05	1.37E-04	1.31E-05	1.33E-05
	L1	25	1.63E-06	3.43E-06	4.64E-06	5.30E-06	1.86E-05		L1	25	2.68E-06	3.67E-06	7.58E-06	4.05E-06	1.06E-05
		40	1.46E-06	1.47E-05	1.50E-05	1.76E-05	3.26E-05			40	1.84E-06	2.39E-06	3.98E-06	4.68E-06	8.05E-06
		55	3.11E-06	2.31E-05	2.63E-05	2.40E-05	8.83E-05			55	1.42E-06	8.98E-06	1.25E-05	9.56E-06	9.81E-06

A-16	L0	25	1.08E-05	2.44E-05	2.89E-05	2.73E-05	2.93E-05	B-16	L0	25	1.35E-05	2.43E-05	2.94E-05	2.77E-05	3.09E-05
		40	5.94E-06	2.83E-05	2.54E-05	2.09E-05	2.04E-05			40	9.92E-06	2.83E-05	2.37E-05	1.62E-05	1.72E-05
		55	8.51E-06	1.02E-03	5.90E-05	2.69E-05	2.61E-05			55	1.34E-05	3.74E-05	1.09E-04	2.17E-05	2.34E-05
	L1	25	3.57E-06	1.71E-05	2.00E-05	1.89E-05	2.28E-05		L1	25	2.51E-06	1.75E-05	2.22E-05	2.28E-05	2.48E-05
		40	3.10E-06	1.05E-05	1.86E-05	1.84E-05	1.76E-05			40	2.30E-06	2.02E-05	1.22E-05	6.55E-06	6.58E-06
		55	3.08E-06	1.40E-05	1.87E-05	1.74E-05	2.67E-05			55	1.90E-06	3.60E-06	4.81E-06	3.40E-06	3.37E-06
A-17	L0	25	1.97E-05	2.91E-05	3.87E-05	4.05E-05	5.23E-05	B-17	L0	25	5.73E-06	8.53E-06	9.55E-06	1.06E-05	1.22E-05
		40	1.37E-05	2.65E-05	2.44E-05	2.24E-05	2.55E-05			40	6.39E-06	1.29E-05	2.09E-05	1.73E-05	1.81E-05
		55	1.91E-05	3.35E-03	7.95E-05	3.92E-05	4.18E-05			55	3.50E-06	2.95E-05	1.25E-04	1.85E-05	1.43E-05
	L1	25	3.40E-06	6.51E-06	1.09E-05	1.16E-05	2.63E-05		L1	25	2.01E-06	7.34E-06	7.45E-06	6.56E-06	8.52E-06
		40	1.47E-06	4.16E-06	2.84E-06	3.20E-06	1.27E-05			40	1.12E-06	6.97E-06	9.73E-06	8.31E-06	1.05E-05
		55	4.20E-06	1.16E-05	1.29E-05	1.58E-05	2.33E-05			55	1.63E-06	1.44E-05	2.00E-05	1.83E-05	1.89E-05
A-18	L0	25	5.42E-06	1.07E-05	1.18E-05	1.25E-05	1.68E-05	B-18	L0	25	1.94E-05	2.32E-05	2.45E-05	2.74E-05	2.73E-05
		40	4.87E-06	2.77E-05	1.42E-05	1.16E-05	1.28E-05			40	1.30E-05	2.13E-05	2.45E-05	2.33E-05	2.28E-05
		55	4.21E-06	1.20E-03	4.68E-05	2.13E-05	1.32E-05			55	1.75E-05	3.37E-05	1.12E-04	2.86E-05	3.29E-05
	L1	25	2.04E-06	7.60E-06	6.68E-06	7.14E-06	1.66E-05		L1	25	4.71E-06	9.18E-06	1.04E-05	1.01E-05	9.14E-06
		40	2.65E-06	1.10E-05	8.78E-06	9.58E-06	1.57E-05			40	2.37E-06	5.96E-06	7.68E-06	9.27E-06	7.95E-06
		55	1.64E-06	1.64E-05	2.17E-05	2.14E-05	2.45E-05			55	3.98E-06	4.35E-06	1.13E-05	8.71E-06	1.24E-05
A-19	L0	25	3.62E-06	7.61E-06	9.06E-06	4.62E-05	1.76E-04	B-19	L0	25	4.64E-06	1.10E-05	1.20E-05	3.67E-05	4.20E-05
		40	3.79E-06	2.74E-05	1.06E-05	1.66E-05	1.87E-05			40	3.90E-06	1.16E-05	1.13E-05	9.58E-06	1.78E-05
		55	3.25E-06	2.75E-03	5.57E-05	1.65E-05	1.94E-05			55	2.99E-06	2.39E-05	6.41E-05	6.86E-06	8.08E-06
	L1	25	1.91E-06	8.45E-06	7.80E-06	5.22E-05	5.15E-04		L1	25	2.50E-06	7.47E-06	1.29E-05	3.71E-05	6.03E-05
		40	1.20E-06	1.88E-06	5.15E-06	1.59E-05	7.66E-05			40	1.62E-06	9.13E-06	6.78E-06	1.04E-05	2.44E-05
		55	1.49E-06	1.34E-05	1.25E-05	1.26E-05	2.75E-05			55	1.95E-06	1.36E-05	6.59E-06	5.81E-06	8.21E-06
A-20	L0	25	4.18E-06	2.22E-05	1.90E-05	2.19E-05	2.86E-05	B-20	L0	25	7.27E-06	1.42E-05	1.69E-05	2.73E-05	1.94E-05
		40	2.82E-06	1.83E-05	1.21E-05	1.08E-05	1.65E-05			40	4.46E-06	1.42E-05	1.57E-05	1.50E-05	1.35E-05
		55	4.19E-06	1.18E-03	2.58E-05	1.26E-05	1.26E-05			55	2.47E-06	3.94E-05	1.17E-04	9.99E-06	1.06E-05
	L1	25	2.17E-06	1.69E-05	1.57E-05	1.89E-05	3.82E-05		L1	25	3.33E-06	1.80E-05	1.98E-05	1.95E-05	2.28E-05
		40	1.44E-06	1.15E-05	1.20E-05	1.17E-05	2.76E-05			40	1.37E-06	1.01E-05	1.19E-05	1.28E-05	8.59E-06
		55	3.67E-06	1.60E-05	1.80E-05	1.83E-05	2.61E-05			55	2.83E-06	2.03E-05	2.64E-05	2.04E-05	2.18E-05

[Table 2-1-3] 65°C/80%RH

[Table 2-1-4] 70°C/75%RH

65°C/80%RH								70°C/75%RH							
No.	Layer	[mm]	0 h	500 h	1000 h	1500 h	2000 h	No.	Layer	[mm]	0 h	625h	1250h	1875h	2500h
C-1	L0	25	1.96E-05	3.56E-05	4.12E-05	5.01E-05	5.35E-05	D-1	L0	25	1.45E-05	2.72E-05	3.24E-05	3.59E-05	4.01E-05
		40	1.83E-05	2.74E-05	3.30E-05	3.83E-05	4.30E-05			40	1.40E-05	3.11E-05	2.90E-05	3.27E-05	4.56E-05
		55	9.52E-06	1.87E-05	2.14E-05	2.76E-05	2.73E-05			55	8.32E-06	4.86E-05	3.29E-05	3.15E-05	3.42E-05
	L1	25	1.66E-06	1.78E-06	2.10E-06	6.34E-06	6.98E-06		L1	25	1.99E-06	7.18E-06	1.22E-05	1.26E-05	1.55E-05
		40	1.30E-06	1.35E-06	1.58E-06	3.85E-06	5.35E-06			40	1.44E-06	1.64E-06	1.73E-06	1.86E-06	1.23E-05
		55	1.43E-06	2.77E-06	2.87E-06	4.65E-06	5.24E-06			55	1.21E-06	9.81E-06	8.28E-06	8.88E-06	1.25E-05
C-2	L0	25	1.65E-05	2.77E-05	2.66E-05	3.92E-05	3.95E-05	D-2	L0	25	1.62E-05	2.52E-05	2.66E-05	3.00E-05	3.69E-05
		40	2.02E-05	3.47E-05	3.63E-05	4.51E-05	4.97E-05			40	1.19E-05	2.51E-05	2.49E-05	2.76E-05	3.10E-05
		55	7.43E-06	1.99E-05	2.26E-05	3.50E-05	2.77E-05			55	1.05E-05	1.25E-04	3.33E-05	3.93E-05	5.05E-05
	L1	25	1.27E-06	3.52E-06	4.07E-06	9.68E-06	9.98E-06		L1	25	2.32E-06	2.85E-06	3.21E-06	4.24E-06	4.86E-06
		40	2.00E-06	7.08E-06	6.81E-06	7.65E-06	9.74E-06			40	1.11E-06	1.53E-06	1.40E-06	1.73E-06	2.52E-06
		55	1.20E-06	1.78E-06	3.23E-06	5.15E-06	4.67E-06			55	1.31E-06	2.38E-06	2.68E-06	6.92E-06	1.52E-05
C-3	L0	25	1.19E-05	2.33E-05	2.44E-05	2.95E-05	3.04E-05	D-3	L0	25	9.12E-06	1.98E-05	2.23E-05	2.57E-05	2.79E-05
		40	1.60E-05	2.97E-05	3.33E-05	4.32E-05	3.93E-05			40	1.07E-05	2.39E-05	2.02E-05	2.92E-05	3.00E-05
		55	8.60E-06	4.82E-05	3.16E-05	3.97E-05	3.17E-05			55	5.35E-06	1.73E-04	2.53E-05	2.87E-05	3.12E-05

	L1	25	1.91E-06	2.18E-06	3.03E-06	3.45E-06	3.33E-06		L1	25	2.69E-06	3.61E-06	3.27E-06	4.05E-06	4.83E-06
		40	1.46E-06	3.74E-06	3.61E-06	6.68E-06	4.60E-06			40	1.56E-06	2.55E-06	1.81E-06	2.54E-06	2.66E-06
		55	1.39E-06	1.19E-05	1.32E-05	1.51E-05	1.37E-05			55	1.48E-06	1.58E-05	1.66E-05	1.67E-05	1.99E-05
C-4	L0	25	2.17E-05	4.86E-05	4.95E-05	5.27E-05	5.27E-05	D-4	L0	25	1.63E-05	3.38E-05	3.26E-05	4.19E-05	4.11E-05
		40	2.33E-05	6.22E-05	3.65E-05	4.35E-05	4.46E-05			40	1.80E-05	3.92E-05	4.09E-05	4.88E-05	4.59E-05
		55	1.46E-05	1.53E-03	2.97E-05	4.34E-05	3.64E-05			55	1.20E-05	2.47E-04	2.53E-05	3.35E-05	3.90E-05
	L1	25	1.19E-06	1.49E-05	1.37E-05	1.39E-05	1.29E-05		L1	25	2.82E-06	9.47E-06	1.08E-05	1.16E-05	1.24E-05
		40	1.27E-06	1.70E-06	1.73E-06	1.75E-06	1.97E-06			40	1.78E-06	2.38E-06	7.19E-06	9.53E-06	1.43E-05
		55	3.09E-06	4.36E-06	3.92E-06	4.76E-06	4.74E-06			55	1.44E-06	5.60E-06	3.17E-06	7.47E-06	1.01E-05
C-5	L0	25	1.42E-05	2.21E-05	2.25E-05	3.12E-05	3.05E-05	D-5	L0	25	1.58E-05	2.47E-05	2.77E-05	3.40E-05	3.66E-05
		40	1.55E-05	5.01E-05	3.07E-05	3.63E-05	3.41E-05			40	2.01E-05	4.76E-05	4.37E-05	4.51E-05	5.35E-05
		55	7.61E-06	7.94E-04	2.45E-05	3.06E-05	3.14E-05			55	9.95E-06	3.13E-04	2.46E-05	2.78E-05	3.11E-05
	L1	25	2.34E-06	5.21E-06	6.20E-06	1.05E-05	1.17E-05		L1	25	1.68E-06	3.97E-06	3.93E-06	3.88E-06	5.27E-06
		40	1.13E-06	2.21E-06	1.87E-06	3.37E-06	1.92E-06			40	1.65E-06	1.98E-06	2.05E-06	2.25E-06	2.79E-06
		55	1.64E-06	1.52E-05	1.01E-05	1.25E-05	1.54E-05			55	1.58E-06	7.71E-06	7.69E-06	8.49E-06	1.08E-05
C-6	L0	25	1.33E-05	2.30E-05	2.44E-05	3.01E-05	3.45E-05	D-6	L0	25	8.81E-06	1.87E-05	1.92E-05	2.05E-05	1.86E-04
		40	2.12E-05	4.96E-05	3.49E-05	4.39E-05	4.59E-05			40	8.30E-06	2.18E-05	1.80E-05	2.18E-05	2.10E-04
		55	1.03E-05	6.43E-04	2.58E-05	3.24E-05	3.20E-05			55	3.98E-06	1.76E-04	1.43E-05	1.85E-05	1.53E-04
	L1	25	2.27E-06	3.03E-06	3.69E-06	9.49E-06	8.89E-06		L1	25	2.00E-06	5.84E-06	6.34E-06	6.72E-06	5.61E-05
		40	1.86E-06	2.51E-06	4.35E-06	2.96E-06	7.32E-06			40	1.79E-06	2.25E-06	1.97E-06	2.10E-06	2.94E-05
		55	1.48E-06	9.37E-06	5.14E-06	6.83E-06	6.46E-06			55	1.60E-06	1.80E-05	9.56E-06	1.21E-05	4.11E-05
C-7	L0	25	1.40E-05	1.94E-05	1.98E-05	2.76E-05	2.78E-05	D-7	L0	25	1.22E-05	1.89E-05	2.70E-05	2.89E-05	3.40E-05
		40	1.12E-05	2.19E-05	1.60E-05	3.20E-05	2.24E-05			40	1.54E-05	3.41E-05	3.06E-05	3.59E-05	4.65E-05
		55	7.14E-06	2.43E-04	2.02E-05	2.69E-05	2.51E-05			55	7.66E-06	2.92E-04	2.23E-05	2.52E-05	2.65E-05
	L1	25	3.31E-06	3.41E-06	3.65E-06	4.25E-06	5.25E-06		L1	25	1.80E-06	3.41E-06	6.41E-06	6.42E-06	1.17E-05
		40	1.56E-06	2.54E-06	2.39E-06	1.70E-05	3.11E-06			40	1.48E-06	1.75E-06	1.94E-06	1.75E-06	1.75E-05
		55	1.55E-06	1.82E-05	1.36E-05	1.43E-05	1.59E-05			55	1.23E-06	9.45E-06	4.91E-06	4.67E-06	6.21E-06
C-8	L0	25	6.44E-06	1.10E-05	1.78E-05	2.13E-05	2.25E-05	D-8	L0	25	1.63E-05	2.92E-05	3.03E-05	3.75E-05	4.51E-05
		40	5.18E-06	2.17E-05	1.49E-05	1.72E-05	1.79E-05			40	2.44E-05	5.09E-05	4.81E-05	5.08E-05	6.45E-05
		55	3.05E-06	1.12E-03	1.42E-05	1.69E-05	1.72E-05			55	1.25E-05	2.10E-04	3.49E-05	3.57E-05	4.56E-05
	L1	25	3.04E-06	4.13E-06	7.57E-06	9.05E-06	8.44E-06		L1	25	2.44E-06	3.32E-06	3.26E-06	6.14E-06	1.11E-05
		40	1.20E-06	6.13E-06	4.84E-06	5.18E-06	6.19E-06			40	4.40E-06	4.51E-06	4.11E-06	4.96E-06	7.90E-06
		55	2.34E-06	1.72E-05	1.30E-05	1.39E-05	1.64E-05			55	2.43E-06	7.61E-06	7.62E-06	8.56E-06	1.46E-05
C-9	L0	25	1.14E-05	2.56E-05	3.36E-05	3.82E-05	4.12E-05	D-9	L0	25	1.31E-05	2.13E-05	2.39E-05	2.59E-05	3.57E-05
		40	1.19E-05	3.71E-05	2.32E-05	2.60E-05	3.17E-05			40	1.58E-05	4.22E-05	3.36E-05	3.61E-05	4.37E-05
		55	7.63E-06	9.24E-04	2.97E-05	3.08E-05	3.15E-05			55	8.18E-06	3.10E-04	2.99E-05	2.82E-05	5.03E-05
	L1	25	1.39E-06	1.45E-06	5.19E-06	4.86E-06	6.27E-06		L1	25	1.46E-06	1.65E-06	1.97E-06	2.03E-06	4.24E-06
		40	2.26E-06	3.10E-06	4.02E-06	4.60E-06	6.83E-06			40	2.01E-06	2.86E-06	4.68E-06	4.48E-06	1.32E-05
		55	4.88E-06	9.32E-06	1.06E-05	8.79E-06	7.51E-06			55	2.47E-06	1.55E-05	1.43E-05	1.42E-05	3.49E-05
C-10	L0	25	9.04E-06	1.72E-05	2.58E-05	2.86E-05	3.24E-05	D-10	L0	25	3.82E-06	1.87E-05	2.41E-05	2.63E-05	2.82E-05
		40	4.82E-06	1.96E-05	1.66E-05	1.91E-05	1.74E-05			40	4.00E-06	1.32E-05	1.41E-05	1.49E-05	1.70E-05
		55	3.19E-06	8.00E-04	1.79E-05	2.03E-05	2.10E-05			55	3.48E-06	5.98E-05	1.72E-05	1.81E-05	2.04E-05
	L1	25	3.88E-06	4.62E-06	5.04E-06	4.66E-06	6.54E-06		L1	25	2.08E-06	5.88E-06	5.64E-06	6.38E-06	6.83E-06
		40	1.86E-06	2.23E-06	8.21E-06	6.22E-06	4.04E-06			40	1.61E-06	1.88E-06	1.81E-06	1.86E-06	2.16E-06
		55	1.35E-06	8.47E-06	7.39E-06	8.83E-06	9.63E-06			55	1.34E-06	4.33E-06	4.87E-06	4.42E-06	6.57E-06
C-11	L0	25	1.87E-05	2.54E-05	3.14E-05	3.51E-05	3.59E-05	D-11	L0	25	4.88E-06	1.39E-05	1.77E-05	1.89E-05	2.68E-05
		40	1.38E-05	3.46E-05	2.28E-05	2.55E-05	2.53E-05			40	4.56E-06	1.45E-05	1.20E-05	1.18E-05	1.36E-05
		55	8.52E-06	2.23E-03	1.75E-05	1.93E-05	2.60E-05			55	2.55E-06	7.62E-05	1.47E-05	1.50E-05	1.67E-05
	L1	25	2.33E-06	2.58E-06	2.63E-06	2.91E-06	4.57E-06		L1	25	1.38E-06	2.48E-06	2.03E-06	2.24E-06	7.74E-06
		40	1.95E-06	7.24E-06	7.07E-06	6.69E-06			40	1.07E-06	6.32E-06	5.42E-06	2.90E-06	3.79E-06	

		55	1.34E-06	1.38E-05	1.35E-05	3.02E-06	1.38E-05			55	1.58E-06	1.37E-05	7.79E-06	7.38E-06	8.70E-06
C-12	L0	25	1.81E-05	3.64E-05	4.84E-05	5.67E-05	5.64E-05	D-12	L0	25	5.86E-06	1.10E-05	1.41E-05	1.51E-05	1.59E-05
		40	1.46E-05	2.54E-05	2.10E-05	2.34E-05	2.36E-05			40	6.13E-06	1.29E-05	1.25E-05	1.32E-05	1.51E-05
		55	8.71E-06	8.64E-04	3.03E-05	3.52E-05	3.58E-05			55	2.61E-06	6.29E-05	1.24E-05	1.89E-05	2.17E-05
	L1	25	2.26E-06	8.90E-06	1.48E-05	1.83E-05	1.48E-05		L1	25	1.67E-06	2.05E-06	2.12E-06	2.62E-06	2.62E-06
		40	4.97E-06	3.29E-06	4.16E-06	4.87E-06	4.91E-06			40	1.32E-06	3.32E-06	3.16E-06	3.60E-06	4.59E-06
		55	1.33E-06	1.68E-05	1.63E-05	1.65E-05	1.37E-05			55	3.92E-06	6.73E-06	6.16E-06	1.14E-05	1.74E-05
C-13	L0	25	7.48E-06	1.16E-05	1.52E-05	1.81E-05	1.89E-05	D-13	L0	25	1.30E-05	2.88E-05	3.55E-05	3.69E-05	3.95E-05
		40	8.15E-06	2.15E-05	1.35E-05	1.63E-05	1.59E-05			40	5.18E-06	2.05E-05	2.20E-05	2.25E-05	2.46E-05
		55	6.09E-06	7.95E-04	1.33E-05	2.05E-05	2.00E-05			55	9.24E-06	7.35E-05	2.58E-05	2.79E-05	3.10E-05
	L1	25	2.94E-06	3.50E-06	3.32E-06	3.99E-06	6.38E-06		L1	25	4.83E-06	4.65E-06	4.55E-06	4.68E-06	4.79E-06
		40	3.51E-06	3.81E-06	5.78E-06	6.57E-06	6.74E-06			40	1.24E-06	6.19E-06	7.09E-06	6.98E-06	6.73E-06
		55	1.77E-06	9.33E-06	8.78E-06	1.36E-05	9.72E-06			55	1.38E-06	1.20E-05	1.04E-05	9.81E-06	9.90E-06
C-14	L0	25	4.39E-06	1.59E-05	2.34E-05	2.78E-05	2.89E-05	D-14	L0	25	1.45E-05	4.04E-05	4.76E-05	5.16E-05	6.61E-05
		40	3.44E-06	2.14E-05	1.18E-05	1.41E-05	1.42E-05			40	8.06E-06	2.32E-05	2.52E-05	2.77E-05	2.85E-05
		55	3.26E-06	2.32E-03	1.48E-05	2.19E-05	1.79E-05			55	1.12E-05	9.06E-05	3.50E-05	4.20E-05	5.05E-05
	L1	25	2.14E-06	5.90E-06	6.48E-06	6.78E-06	7.26E-06		L1	25	1.28E-06	4.13E-06	4.24E-06	4.67E-06	1.99E-05
		40	2.05E-06	2.80E-06	2.08E-06	2.69E-06	5.09E-06			40	1.29E-06	1.53E-06	1.49E-06	1.72E-06	1.74E-06
		55	1.64E-06	1.49E-05	1.16E-05	2.05E-05	1.03E-05			55	3.84E-06	2.01E-05	6.75E-06	7.81E-06	1.08E-05
C-15	L0	25	1.27E-05	1.54E-05	1.50E-05	1.78E-05	2.26E-05	D-15	L0	25	1.36E-05	4.04E-05	3.41E-05	4.08E-05	3.99E-05
		40	9.13E-06	2.52E-05	1.03E-05	1.53E-05	1.73E-05			40	1.46E-05	2.32E-05	2.70E-05	3.40E-05	3.87E-05
		55	9.12E-06	2.51E-03	1.30E-05	1.89E-05	2.51E-05			55	1.43E-05	9.06E-05	3.51E-05	3.71E-05	4.51E-05
	L1	25	2.05E-06	4.92E-06	4.29E-06	7.85E-06	1.37E-05		L1	25	1.81E-05	4.13E-06	2.32E-05	2.32E-05	2.36E-05
		40	3.34E-06	4.25E-06	3.35E-06	6.85E-06	1.05E-05			40	1.93E-05	1.53E-06	2.04E-05	2.42E-05	2.52E-05
		55	1.46E-06	7.52E-06	4.40E-06	1.74E-05	1.64E-05			55	2.10E-05	2.01E-05	2.58E-05	2.63E-05	2.72E-05
C-16	L0	25	7.41E-06	8.92E-06	1.12E-05	1.23E-05	1.29E-05	D-16	L0	25	4.70E-06	1.95E-05	2.63E-05	2.66E-05	2.83E-05
		40	4.28E-06	8.49E-06	5.77E-06	5.97E-06	1.04E-05			40	3.81E-06	1.14E-05	1.48E-05	1.58E-05	1.66E-05
		55	3.27E-06	4.93E-04	6.27E-06	7.38E-06	6.99E-06			55	3.25E-06	2.23E-05	2.29E-05	2.30E-05	2.47E-05
	L1	25	2.79E-06	3.18E-06	5.55E-06	7.83E-06	7.77E-06		L1	25	1.51E-06	1.71E-06	1.90E-06	2.03E-06	2.03E-06
		40	1.70E-06	1.99E-06	2.43E-06	2.62E-06	7.78E-06			40	1.10E-06	1.30E-06	1.45E-06	1.54E-06	1.69E-06
		55	3.92E-06	9.04E-06	7.13E-06	8.26E-06	8.17E-06			55	3.69E-06	7.23E-06	1.03E-05	1.03E-05	1.07E-05
C-17	L0	25	6.73E-06	8.02E-06	8.47E-06	1.34E-05	1.43E-05	D-17	L0	25	4.67E-06	1.18E-05	1.54E-05	1.72E-05	1.93E-05
		40	4.66E-06	1.31E-05	6.01E-06	7.88E-06	6.90E-06			40	2.43E-06	8.72E-06	9.32E-06	9.65E-06	1.73E-05
		55	3.04E-06	7.12E-04	5.17E-06	9.27E-06	7.80E-06			55	1.65E-06	3.15E-05	8.71E-06	1.09E-05	1.25E-05
	L1	25	3.68E-06	5.39E-06	5.97E-06	1.14E-05	1.36E-05		L1	25	1.42E-06	1.55E-06	4.36E-06	4.12E-06	5.10E-06
		40	2.97E-06	3.70E-06	3.57E-06	3.97E-06	4.74E-06			40	1.12E-06	1.27E-06	1.33E-06	1.43E-06	7.59E-06
		55	1.48E-06	1.09E-05	6.73E-06	1.24E-05	1.01E-05			55	1.55E-06	2.28E-06	5.56E-06	6.77E-06	7.30E-06
C-18	L0	25	2.19E-05	2.45E-05	2.57E-05	2.60E-05	2.98E-05	D-18	L0	25	6.66E-06	1.92E-05	2.88E-05	3.15E-05	3.56E-05
		40	8.25E-06	1.51E-05	1.26E-05	1.22E-05	1.27E-05			40	1.02E-05	1.61E-05	1.74E-05	1.84E-05	4.70E-05
		55	9.25E-06	7.99E-04	1.35E-05	1.53E-05	1.60E-05			55	5.09E-06	5.89E-05	2.09E-05	2.10E-05	2.53E-05
	L1	25	5.14E-06	5.98E-06	6.33E-06	6.97E-06	1.49E-05		L1	25	2.12E-06	9.24E-06	1.38E-05	1.48E-05	1.73E-05
		40	1.26E-06	4.97E-06	1.01E-05	8.19E-06	7.83E-06			40	6.51E-06	6.87E-06	1.10E-05	1.15E-05	3.97E-05
		55	1.41E-06	6.83E-06	9.92E-06	1.27E-05	1.15E-05			55	2.92E-06	1.24E-05	1.25E-05	1.22E-05	1.78E-05
C-19	L0	25	6.51E-06	9.31E-06	6.14E-05	1.73E-04	1.68E-04	D-19	L0	25	5.91E-06	1.30E-05	1.43E-05	1.49E-05	2.13E-05
		40	4.90E-06	1.28E-05	8.95E-06	2.18E-05	2.04E-05			40	3.18E-06	9.98E-06	1.07E-05	1.13E-05	1.31E-05
		55	4.03E-06	9.65E-04	6.46E-06	9.65E-06	8.87E-06			55	2.33E-06	1.80E-05	1.03E-05	1.02E-05	1.11E-05
	L1	25	3.99E-06	4.39E-06	1.24E-04	3.44E-04	3.32E-04		L1	25	2.14E-06	5.54E-06	5.47E-06	5.24E-06	1.06E-05
		40	1.16E-06	1.55E-06	4.29E-06	3.57E-05	3.19E-05			40	1.31E-06	6.32E-06	6.22E-06	6.00E-06	7.46E-06
		55	3.69E-06	6.86E-06	6.02E-06	1.12E-05	1.01E-05			55	1.04E-06	6.24E-06	6.59E-06	6.79E-06	7.53E-06
C-20	L0	25	1.83E-05	3.49E-05	3.30E-05	3.68E-05	3.58E-05	D-20	L0	25	4.70E-06	7.77E-06	8.74E-06	1.00E-05	1.13E-05



		40	9.63E-06	2.51E-05	2.22E-05	2.54E-05	1.65E-05			40	4.98E-06	7.97E-06	7.32E-06	1.01E-05	1.18E-05				
		55	9.04E-06	2.46E-04	1.31E-05	4.59E-05	1.62E-05			55	2.42E-06	2.12E-05	8.09E-06	9.50E-06	1.01E-05				
		L1	25	2.59E-06	3.50E-05	2.93E-05	3.29E-05			2.63E-05	L1	25	2.36E-06	4.40E-06	7.16E-06	6.89E-06	8.06E-06		
			40	2.16E-06	1.79E-05	1.90E-05	2.17E-05		1.54E-05			40	2.90E-06	3.59E-06	3.50E-06	5.86E-06	6.67E-06		
			55	1.60E-06	1.01E-05	8.35E-06	5.62E-05		1.73E-05			55	1.72E-06	8.63E-06	7.99E-06	9.47E-06	1.16E-05		
			L0	25	5.71E-06	6.88E-06	8.00E-06		8.63E-06	9.56E-06			L0	25	5.71E-06	6.88E-06	8.00E-06	8.63E-06	9.56E-06
				40	7.06E-06	8.31E-06	1.17E-05		1.16E-05	1.40E-05				40	7.06E-06	8.31E-06	1.17E-05	1.16E-05	1.40E-05
				55	3.98E-06	2.35E-05	5.71E-06		6.27E-06	7.73E-06				55	3.98E-06	2.35E-05	5.71E-06	6.27E-06	7.73E-06
			L1	25	3.97E-06	4.23E-06	7.85E-06		8.10E-06	1.03E-05			L1	25	3.97E-06	4.23E-06	7.85E-06	8.10E-06	1.03E-05
			40	4.35E-06	4.24E-06	8.16E-06	7.91E-06	1.00E-05				40	4.35E-06	4.24E-06	8.16E-06	7.91E-06	1.00E-05		
			55	2.27E-06	3.41E-06	3.46E-06	3.88E-06	5.17E-06				55	2.27E-06	3.41E-06	3.46E-06	3.88E-06	5.17E-06		
		L0	25	1.27E-05	1.50E-05	1.92E-05	1.90E-05	2.86E-05			L0	25	1.27E-05	1.50E-05	1.92E-05	1.90E-05	2.86E-05		
			40	8.42E-06	1.22E-05	1.21E-05	1.29E-05	1.55E-05				40	8.42E-06	1.22E-05	1.21E-05	1.29E-05	1.55E-05		
			55	4.96E-06	3.49E-05	8.78E-06	8.45E-06	1.13E-05				55	4.96E-06	3.49E-05	8.78E-06	8.45E-06	1.13E-05		
		L1	25	2.77E-06	5.39E-06	7.35E-06	8.02E-06	1.57E-05			L1	25	2.77E-06	5.39E-06	7.35E-06	8.02E-06	1.57E-05		
			40	2.12E-06	2.54E-06	2.76E-06	3.08E-06	1.03E-05				40	2.12E-06	2.54E-06	2.76E-06	3.08E-06	1.03E-05		
			55	1.76E-06	3.79E-06	3.29E-06	3.43E-06	4.67E-06				55	1.76E-06	3.79E-06	3.29E-06	3.43E-06	4.67E-06		
		L0	25	6.04E-06	9.20E-06	1.15E-05	1.21E-05	1.33E-05			L0	25	6.04E-06	9.20E-06	1.15E-05	1.21E-05	1.33E-05		
			40	5.59E-06	7.95E-06	1.15E-05	1.18E-05	1.38E-05				40	5.59E-06	7.95E-06	1.15E-05	1.18E-05	1.38E-05		
			55	2.12E-06	1.91E-05	4.95E-06	4.99E-06	6.78E-06				55	2.12E-06	1.91E-05	4.95E-06	4.99E-06	6.78E-06		
		L1	25	3.43E-06	3.81E-06	4.10E-06	4.12E-06	7.21E-06			L1	25	3.43E-06	3.81E-06	4.10E-06	4.12E-06	7.21E-06		
			40	1.54E-06	4.44E-06	7.01E-06	7.48E-06	7.77E-06				40	1.54E-06	4.44E-06	7.01E-06	7.48E-06	7.77E-06		
			55	2.14E-06	1.26E-05	6.37E-06	6.65E-06	4.64E-06				55	2.14E-06	1.26E-05	6.37E-06	6.65E-06	4.64E-06		
		L0	25	1.39E-05	1.78E-05	2.72E-05	2.10E-05	2.16E-05			L0	25	1.39E-05	1.78E-05	2.72E-05	2.10E-05	2.16E-05		
			40	9.20E-06	1.38E-05	1.63E-05	1.74E-05	3.57E-05				40	9.20E-06	1.38E-05	1.63E-05	1.74E-05	3.57E-05		
			55	7.39E-06	3.25E-05	2.20E-05	2.49E-05	2.94E-05				55	7.39E-06	3.25E-05	2.20E-05	2.49E-05	2.94E-05		
		L1	25	2.74E-06	3.05E-06	1.24E-05	3.98E-06	4.97E-06			L1	25	2.74E-06	3.05E-06	1.24E-05	3.98E-06	4.97E-06		
			40	2.16E-06	2.41E-06	7.08E-06	5.51E-06	1.81E-05				40	2.16E-06	2.41E-06	7.08E-06	5.51E-06	1.81E-05		
			55	2.64E-06	9.28E-06	1.02E-05	1.30E-05	1.44E-05				55	2.64E-06	9.28E-06	1.02E-05	1.30E-05	1.44E-05		
		L0	25	1.05E-05	1.51E-05	1.60E-05	2.16E-05	3.19E-05			L0	25	1.05E-05	1.51E-05	1.60E-05	2.16E-05	3.19E-05		
			40	6.07E-06	9.46E-06	8.67E-06	1.01E-05	1.13E-05				40	6.07E-06	9.46E-06	8.67E-06	1.01E-05	1.13E-05		
			55	6.09E-06	2.16E-05	1.24E-05	1.35E-05	1.66E-05				55	6.09E-06	2.16E-05	1.24E-05	1.35E-05	1.66E-05		
		L1	25	4.46E-06	7.34E-06	8.99E-06	1.73E-05	2.37E-05			L1	25	4.46E-06	7.34E-06	8.99E-06	1.73E-05	2.37E-05		
			40	2.05E-06	2.42E-06	2.27E-06	2.46E-06	5.45E-06				40	2.05E-06	2.42E-06	2.27E-06	2.46E-06	5.45E-06		
			55	1.79E-06	2.75E-06	2.90E-06	4.53E-06	7.58E-06				55	1.79E-06	2.75E-06	2.90E-06	4.53E-06	7.58E-06		
		L0	25	5.83E-06	7.83E-06	9.17E-06	9.73E-06	1.24E-05			L0	25	5.83E-06	7.83E-06	9.17E-06	9.73E-06	1.24E-05		
			40	5.25E-06	1.44E-05	1.39E-05	1.50E-05	1.47E-05				40	5.25E-06	1.44E-05	1.39E-05	1.50E-05	1.47E-05		
			55	5.41E-06	2.32E-05	1.17E-05	1.15E-05	1.26E-05				55	5.41E-06	2.32E-05	1.17E-05	1.15E-05	1.26E-05		
		L1	25	2.77E-06	6.02E-06	6.13E-06	7.04E-06	6.80E-06			L1	25	2.77E-06	6.02E-06	6.13E-06	7.04E-06	6.80E-06		
			40	1.38E-06	1.04E-05	1.02E-05	1.12E-05	1.27E-05				40	1.38E-06	1.04E-05	1.02E-05	1.12E-05	1.27E-05		
			55	1.33E-06	6.23E-06	5.89E-06	6.64E-06	6.16E-06				55	1.33E-06	6.23E-06	5.89E-06	6.64E-06	6.16E-06		
		L0	25	8.37E-06	1.12E-05	1.24E-05	1.34E-05	2.91E-05			L0	25	8.37E-06	1.12E-05	1.24E-05	1.34E-05	2.91E-05		
			40	4.41E-06	7.27E-06	1.15E-05	1.13E-05	1.35E-05				40	4.41E-06	7.27E-06	1.15E-05	1.13E-05	1.35E-05		
			55	3.53E-06	1.44E-05	7.91E-06	7.69E-06	9.67E-06				55	3.53E-06	1.44E-05	7.91E-06	7.69E-06	9.67E-06		
		L1	25	2.78E-06	3.45E-06	4.83E-06	5.12E-06	1.99E-05			L1	25	2.78E-06	3.45E-06	4.83E-06	5.12E-06	1.99E-05		
			40	1.04E-06	1.97E-06	6.18E-06	7.07E-06	8.03E-06				40	1.04E-06	1.97E-06	6.18E-06	7.07E-06	8.03E-06		
			55	2.08E-06	3.16E-06	7.46E-06	5.22E-06	6.67E-06				55	2.08E-06	3.16E-06	7.46E-06	5.22E-06	6.67E-06		
		L0	25	6.84E-06	1.33E-05	1.83E-05	1.53E-05	1.63E-05			L0	25	6.84E-06	1.33E-05	1.83E-05	1.53E-05	1.63E-05		
			40	6.36E-06	9.04E-06	9.30E-06	1.11E-05	1.20E-05				40	6.36E-06	9.04E-06	9.30E-06	1.11E-05	1.20E-05		
			55	4.14E-06	1.22E-05	7.51E-06	7.27E-06	8.11E-06				55	4.14E-06	1.22E-05	7.51E-06	7.27E-06	8.11E-06		

	L1	25	2.10E-06	6.29E-06	1.22E-05	5.94E-06	6.98E-06
		40	1.90E-06	2.27E-06	2.17E-06	7.67E-06	5.61E-06
		55	1.77E-06	4.20E-06	4.21E-06	4.19E-06	4.66E-06
D-29	L0	25	6.35E-06	8.85E-06	1.16E-05	1.29E-05	1.41E-05
		40	4.46E-06	6.92E-06	8.13E-06	8.89E-06	1.35E-05
		55	3.38E-06	1.45E-05	1.06E-05	8.34E-06	1.07E-05
	L1	25	3.08E-06	3.81E-06	7.31E-06	9.71E-06	1.46E-05
		40	1.15E-06	1.53E-06	2.08E-06	5.58E-06	1.43E-05
		55	3.35E-06	1.06E-05	7.44E-06	7.48E-06	1.04E-05
D-30	L0	25	8.78E-06	1.44E-05	1.56E-05	1.95E-05	1.86E-05
		40	4.67E-06	1.68E-05	1.59E-05	2.01E-05	2.04E-05
		55	4.87E-06	3.29E-05	2.76E-05	1.88E-05	2.01E-05
	L1	25	4.79E-06	1.04E-05	1.23E-05	1.43E-05	1.33E-05
		40	1.75E-06	1.74E-05	1.71E-05	1.91E-05	1.92E-05
		55	1.59E-06	7.90E-06	2.74E-05	1.74E-05	1.77E-05

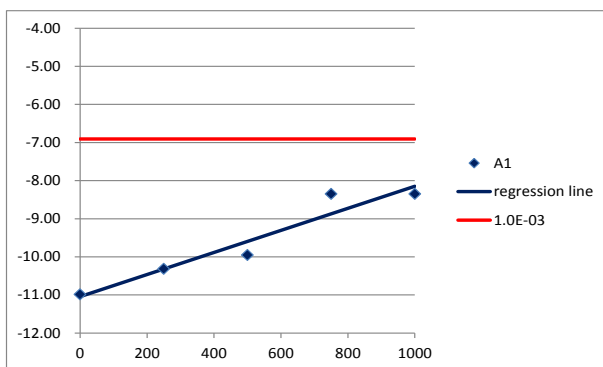
Judge the effectiveness of test data in accordance with “A.2 Data analysis steps for lifetime estimation” specified in Annex A.

## 2-2 Judgement of effectiveness of test data

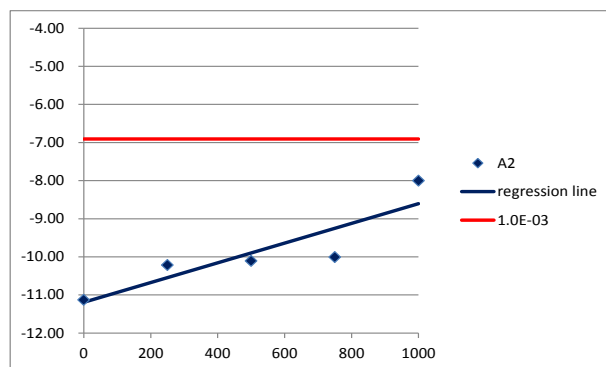
For each specimen calculate a linear regression of the natural logarithm of measured data-errors ( $\ln[Error_t]$ ) as the dependent variable and time as the independent variable against incubation time and plot  $\ln[Error_t]$  versus the incubation time and their best-fit line on the linear-scale graph.

[Figure 2-2-1] – [Table 2-2-90] Show the graphs of each stress condition

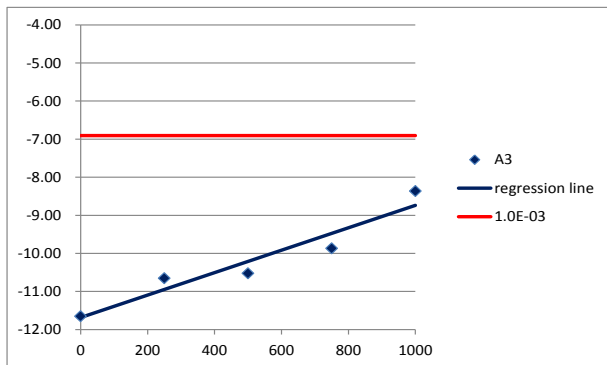
### 1) 80°C/80%RH



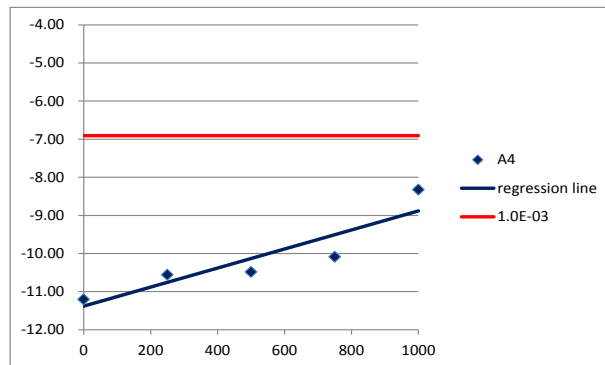
[Figure 2-2-1] A1



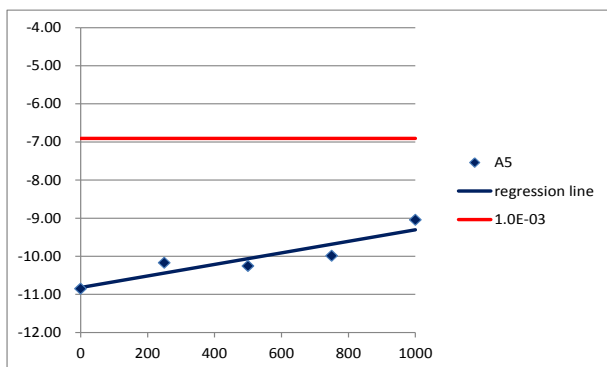
[Figure 2-2-2] A2



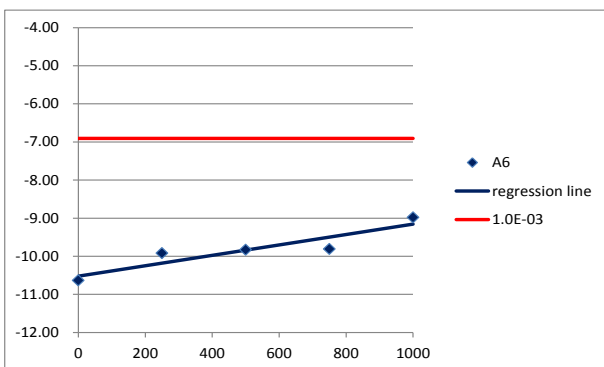
[Figure 2-2-3] A3



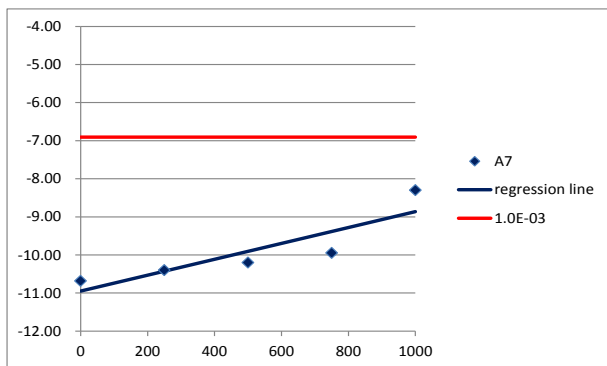
[Figure 2-2-4] A4



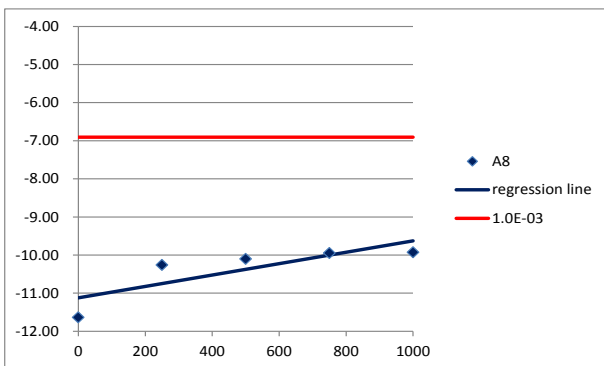
[Figure 2-2-5] A5



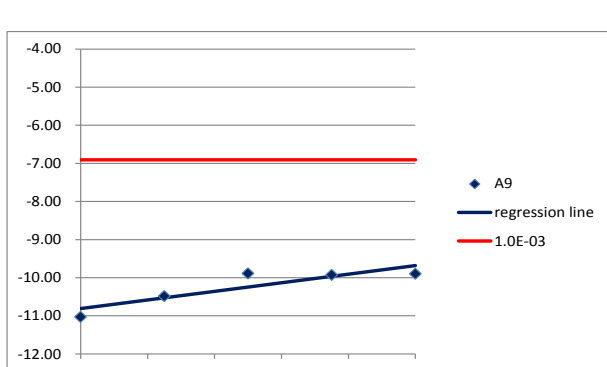
[Figure 2-2-6] A6



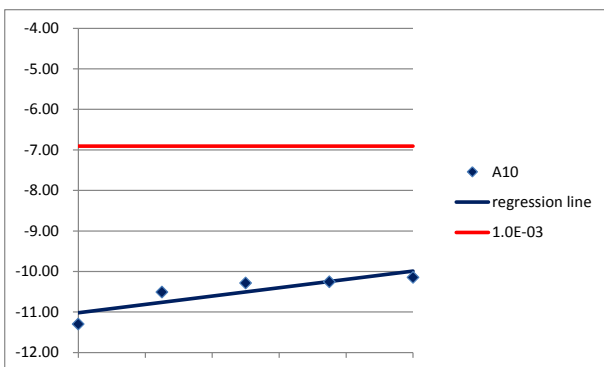
[Figure 2-2-7] A7



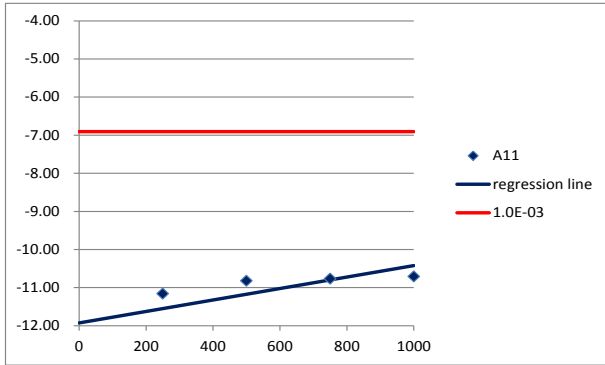
[Figure 2-2-8] A8



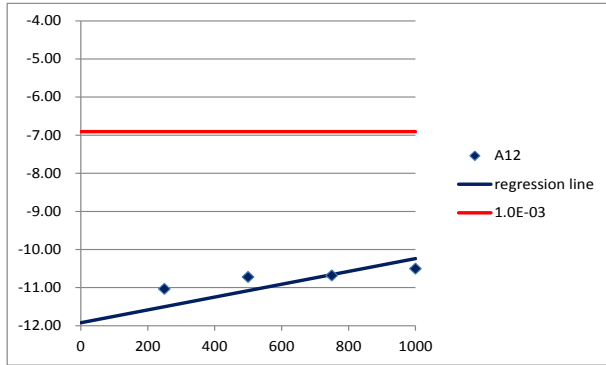
[Figure 2-2-9] A9



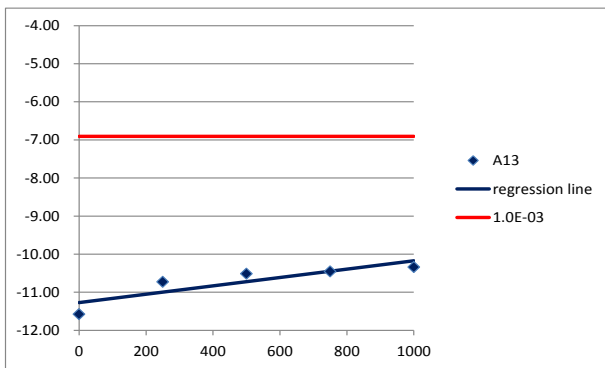
[Figure 2-2-10] A10



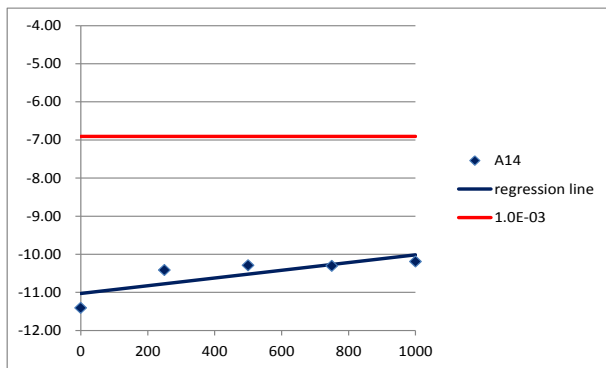
[Figure 2-2-11] A11



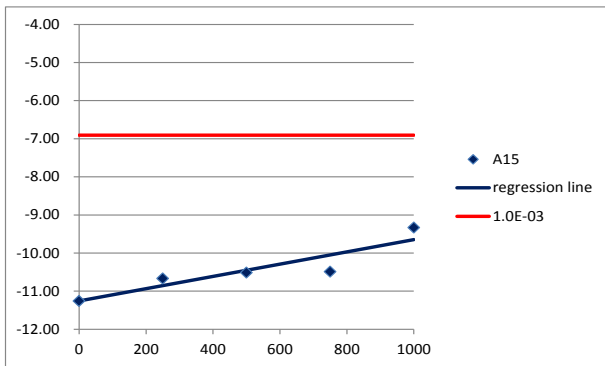
[Figure 2-2-12] A12



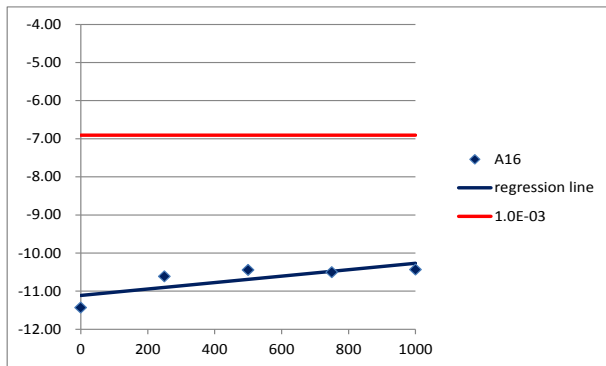
[Figure 2-2-13] A13



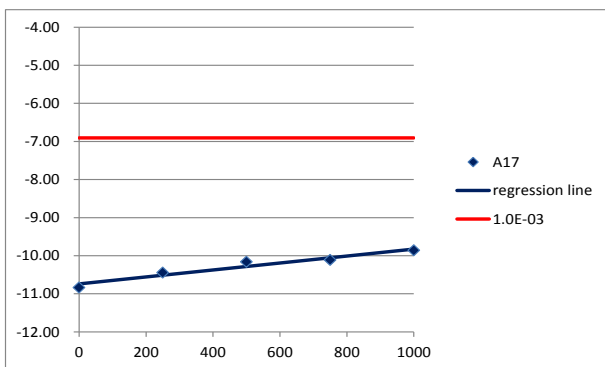
[Figure 2-2-14] A14



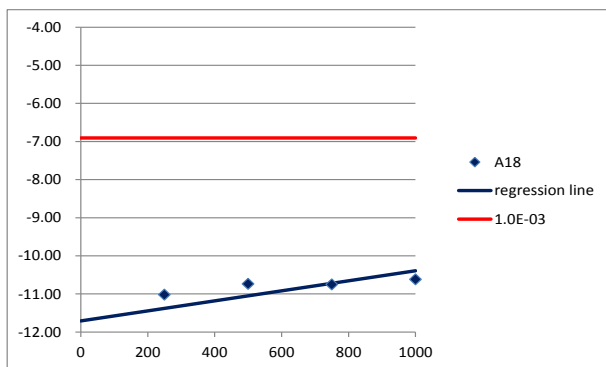
[Figure 2-2-15] A15



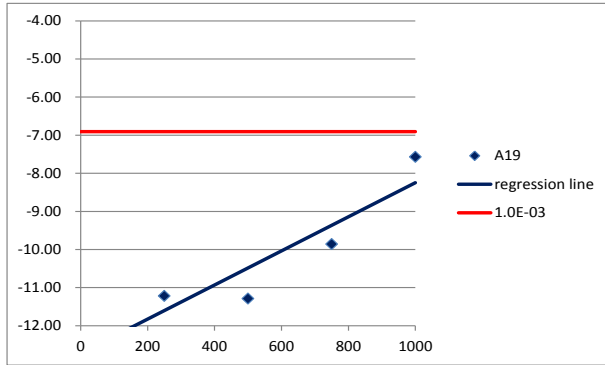
[Figure 2-2-16] A16



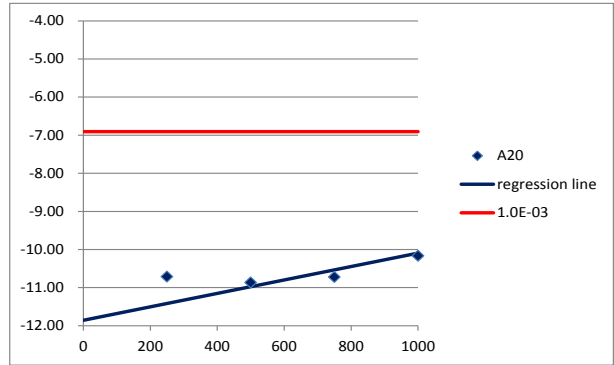
[Figure 2-2-17] A17



[Figure 2-2-18] A18

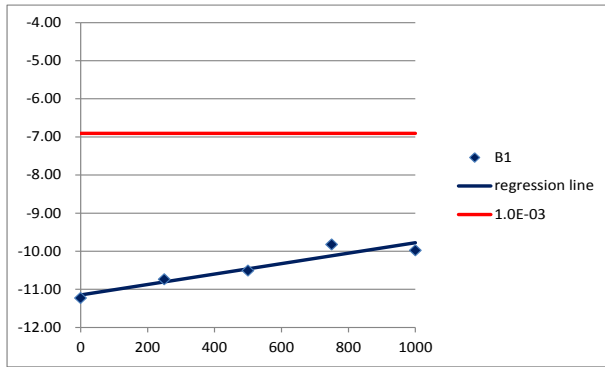


[Figure 2-2-19] A19

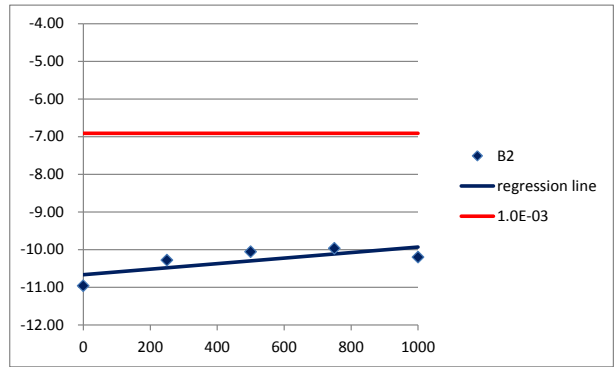


[Figure 2-2-20] A20

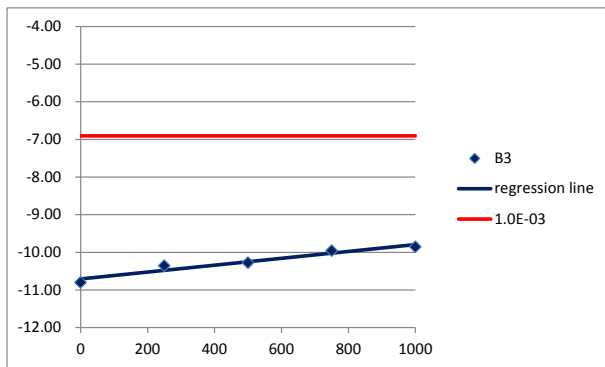
2) 80°C/70%RH



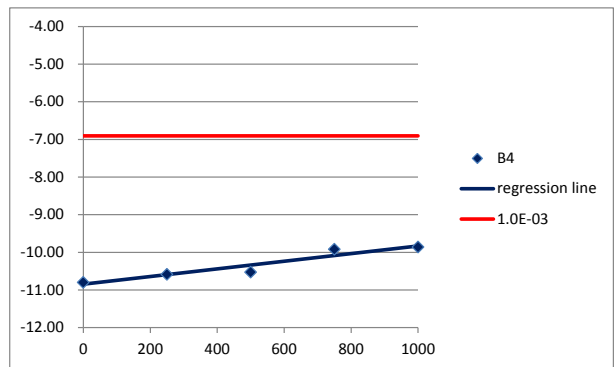
[Figure 2-2-21] B1



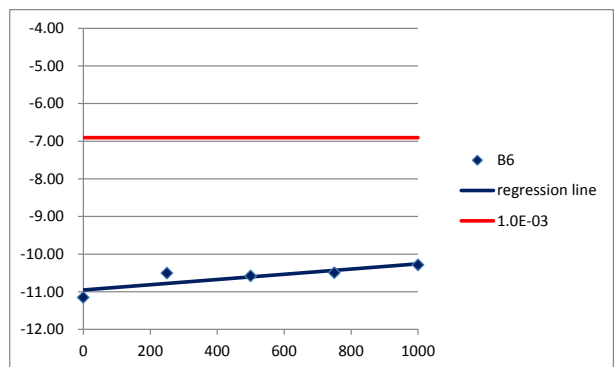
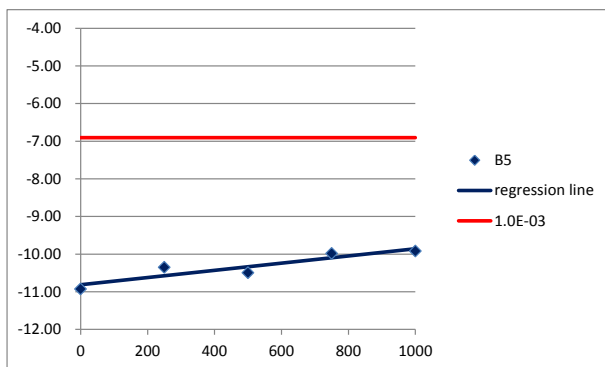
[Figure 2-2-22] B2



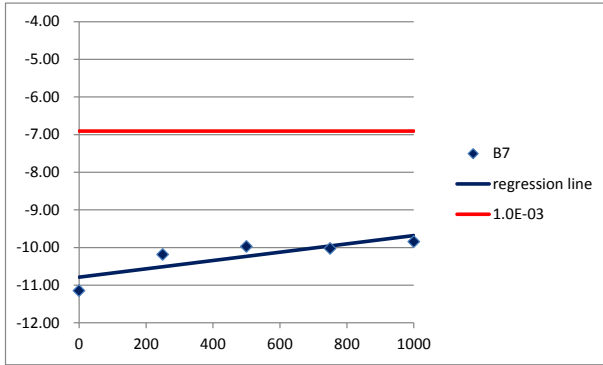
[Figure 2-2-23] B3



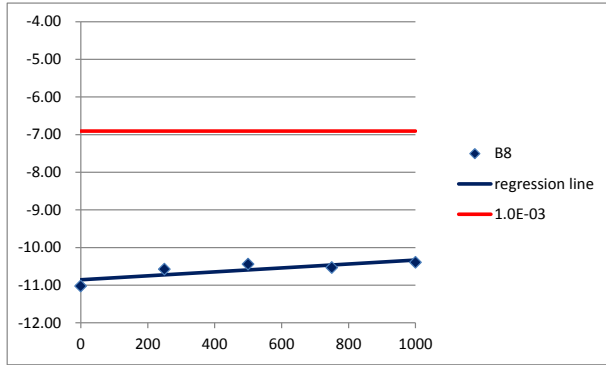
[Figure 2-2-24] B4



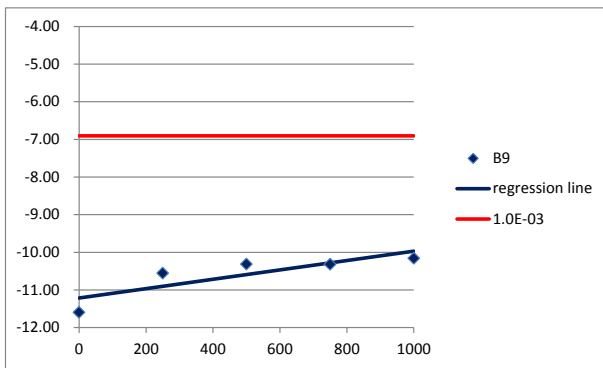
[Figure 2-2-25] B5



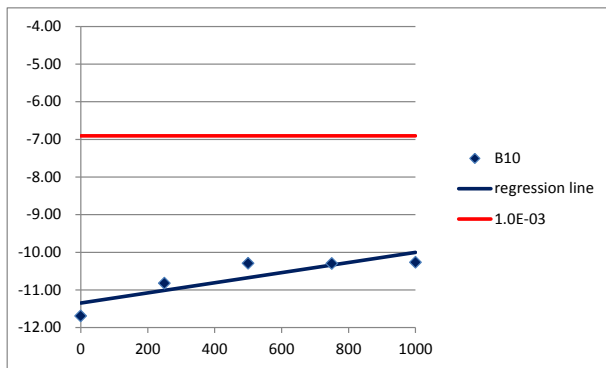
[Figure 2-2-26] B6



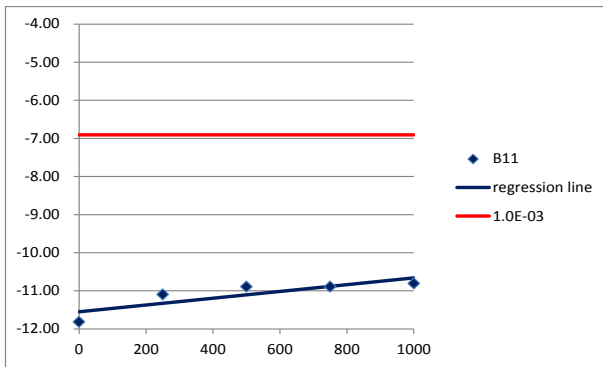
[Figure 2-2-27] B7



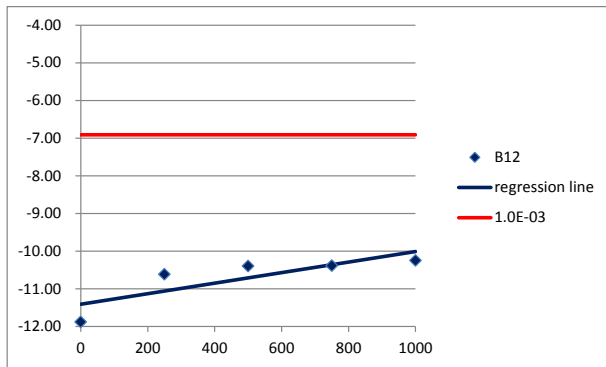
[Figure 2-2-28] B8



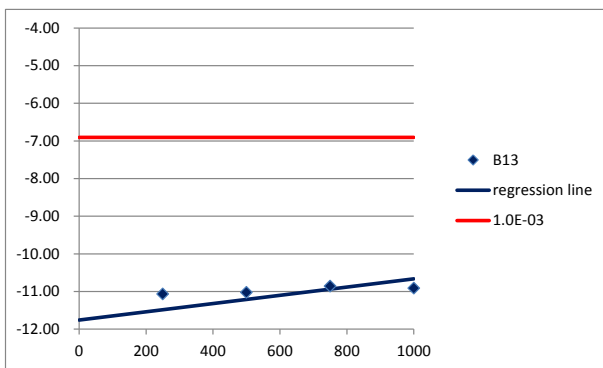
[Figure 2-2-29] B9



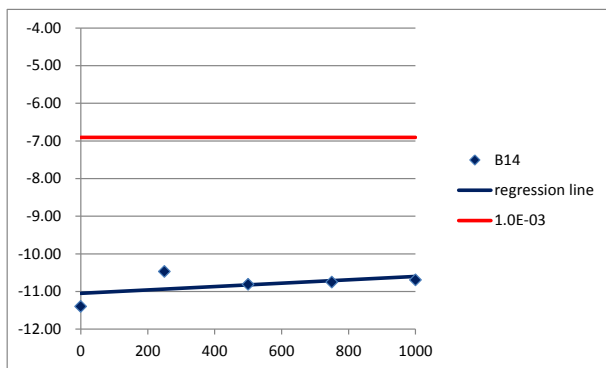
[Figure 2-2-30] B10



[Figure 2-2-31] B11



[Figure 2-2-32] B12

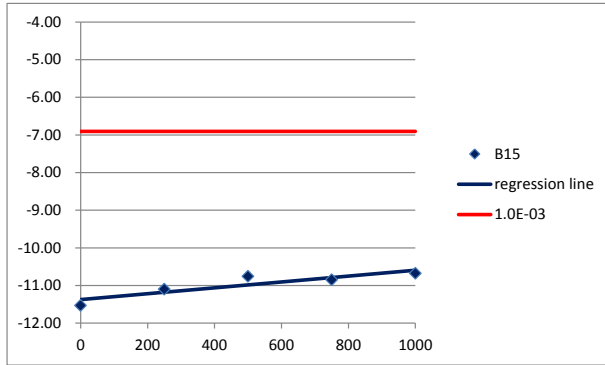


[Figure 2-2-33] B13

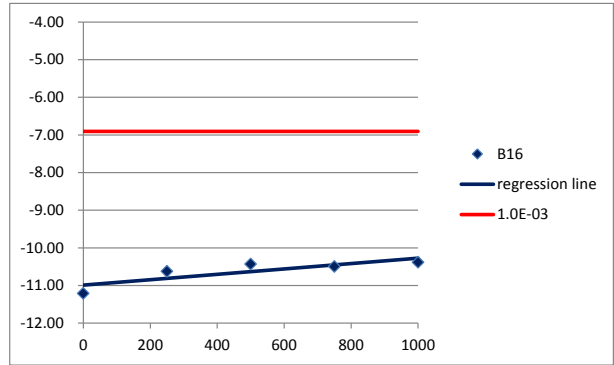


[Figure 2-2-34] B14

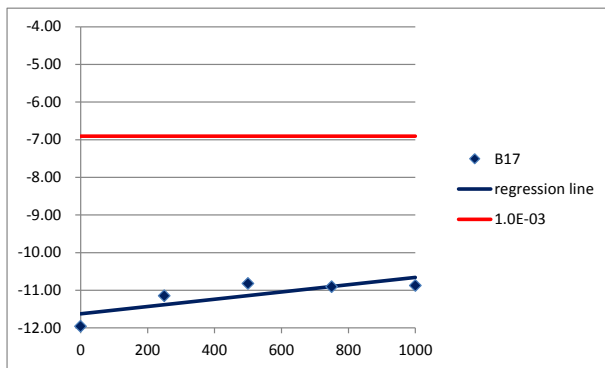




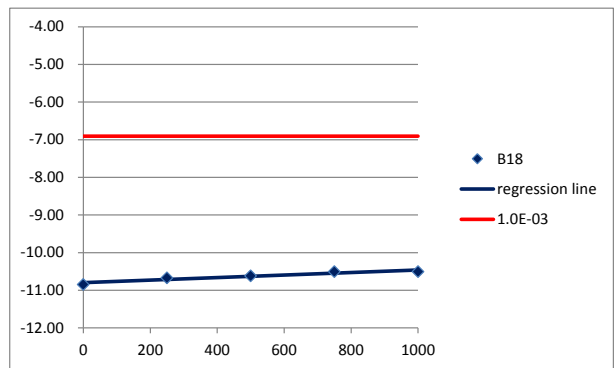
[Figure 2-2-35] B15



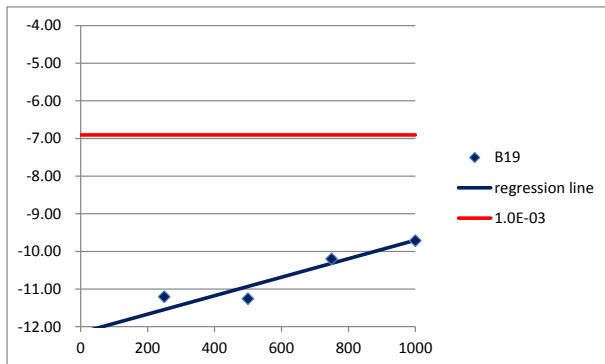
[Figure 2-2-36] B16



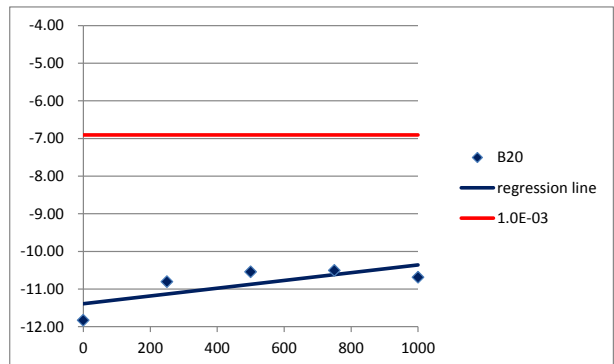
[Figure 2-2-37] B17



[Figure 2-2-38] B18

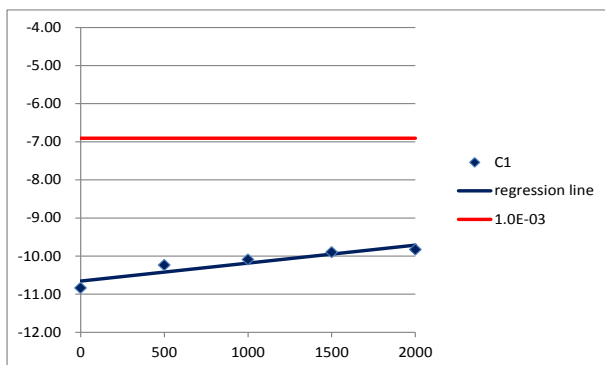


[Figure 2-2-39] B19

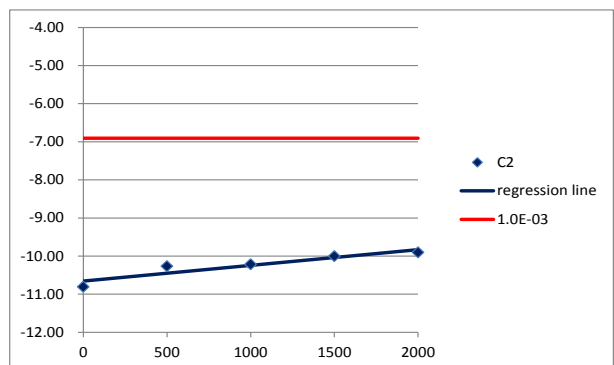


[Figure 2-2-40] B20

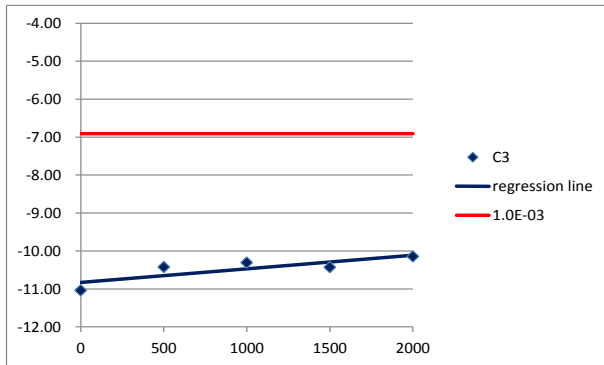
3) 65°C/80%RH



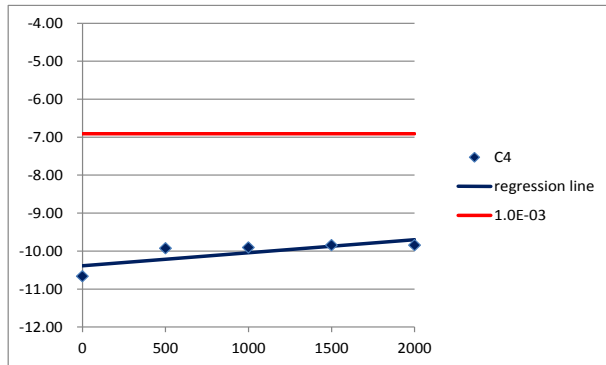
[Figure 2-2-41] C1



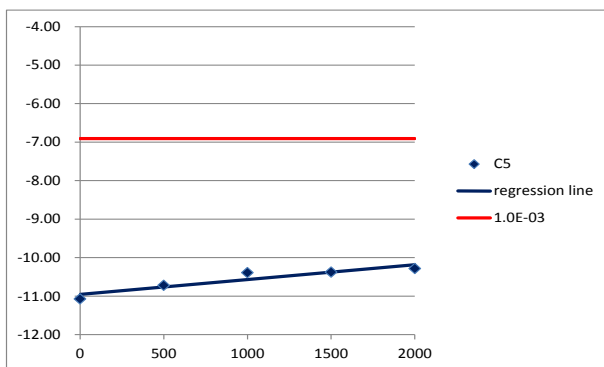
[Figure 2-2-42] C2



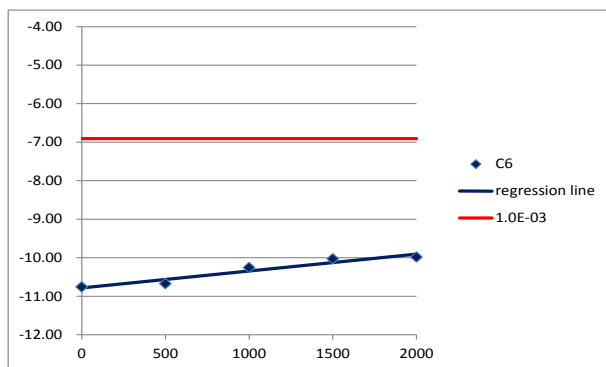
[Figure 2-2-43] C3



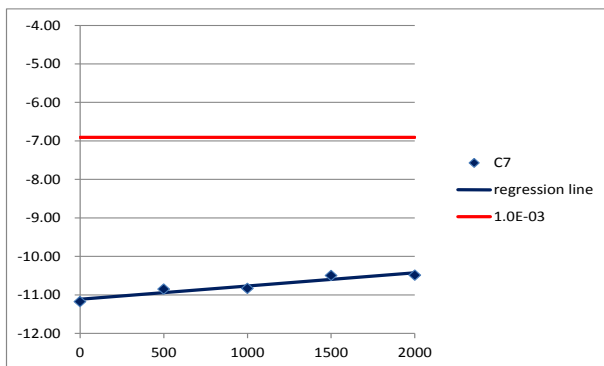
[Figure 2-2-44] C4



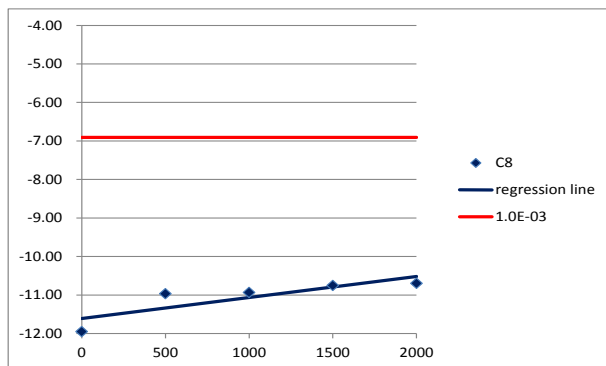
[Figure 2-2-45] C5



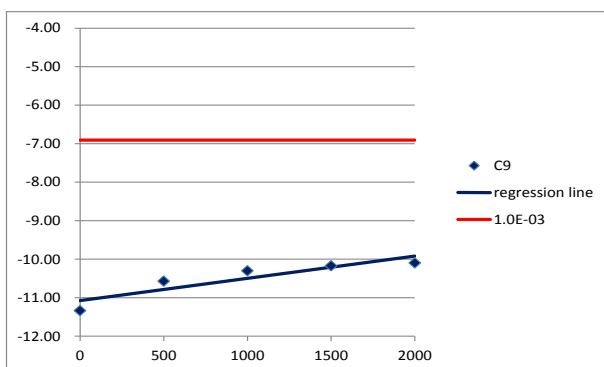
[Figure 2-2-46] C6



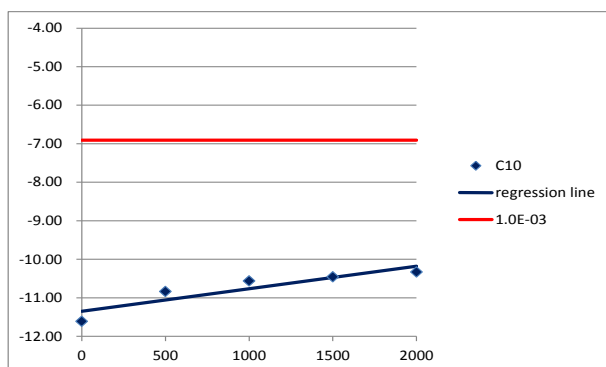
[Figure 2-2-47] C7



[Figure 2-2-48] C8

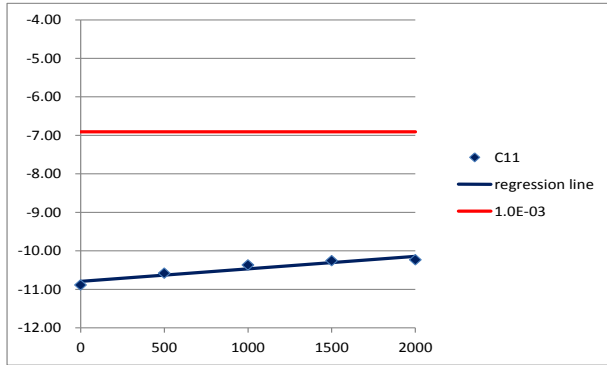


[Figure 2-2-49] C9

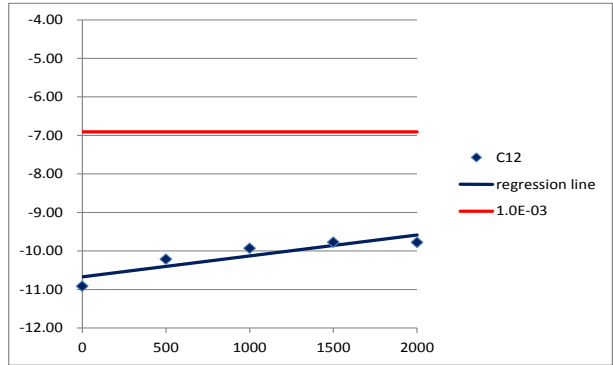


[Figure 2-2-50] C10

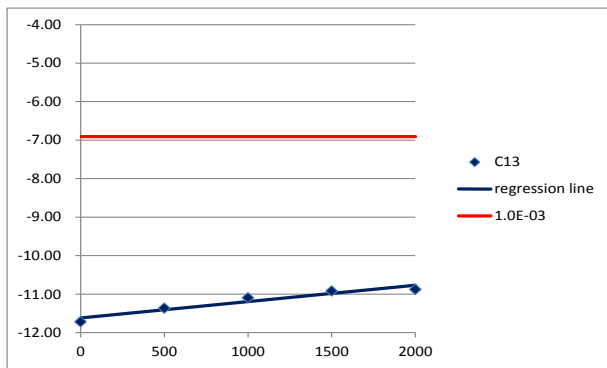




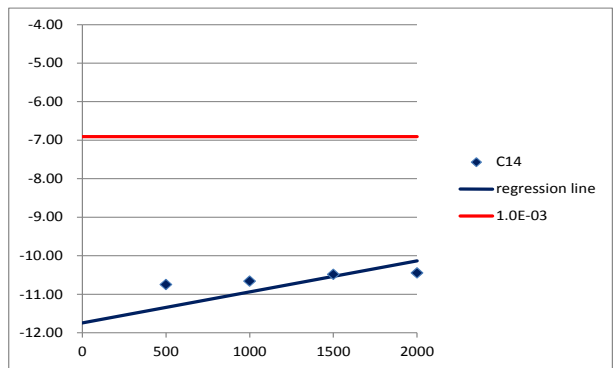
[Figure 2-2-51] C11



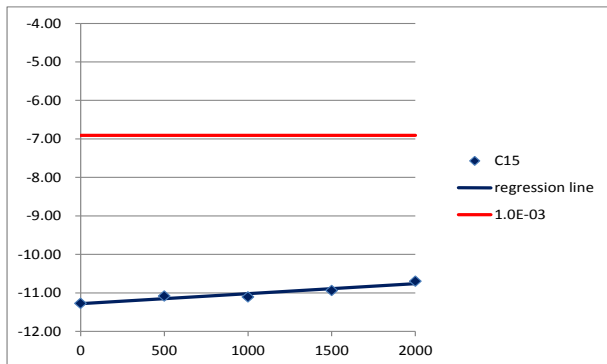
[Figure 2-2-52] C12



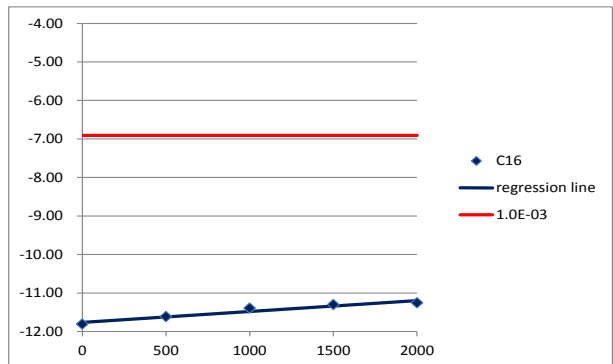
[Figure 2-2-53] C13



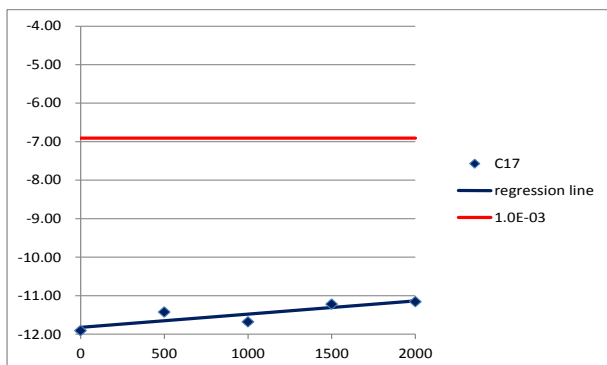
[Figure 2-2-54] C14



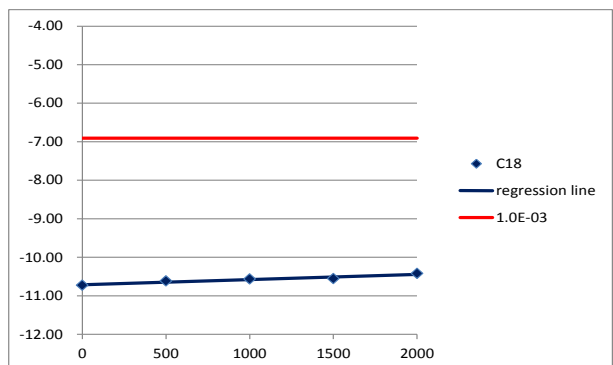
[Figure 2-2-55] C15



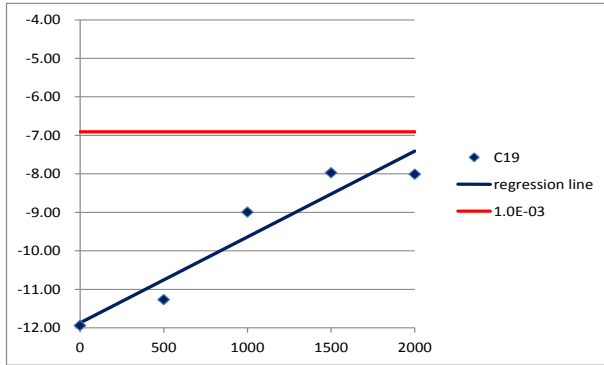
[Figure 2-2-56] C16



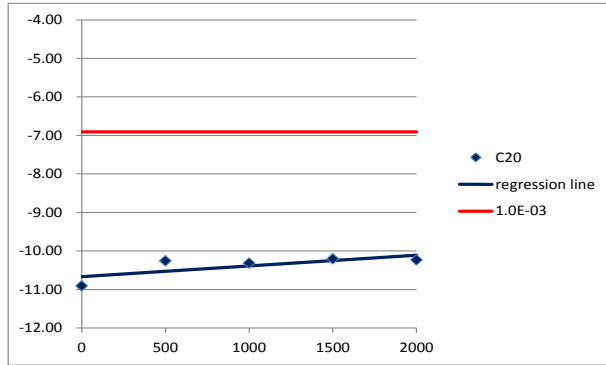
[Figure 2-2-57] C17



[Figure 2-2-58] C18

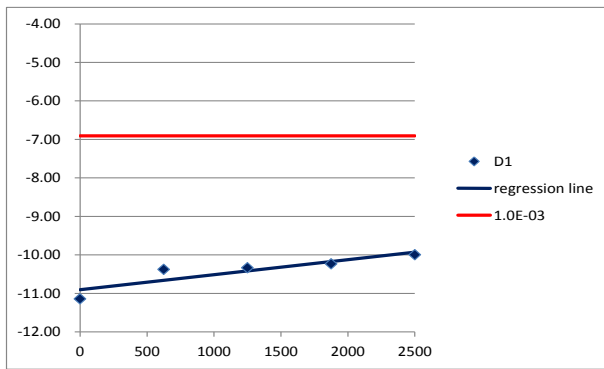


[Figure 2-2-59] C19

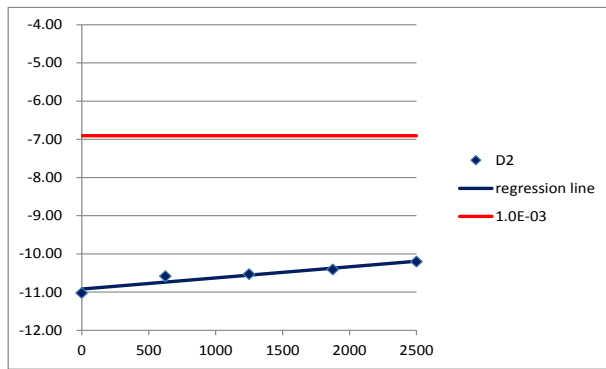


[Figure 2-2-60] C20

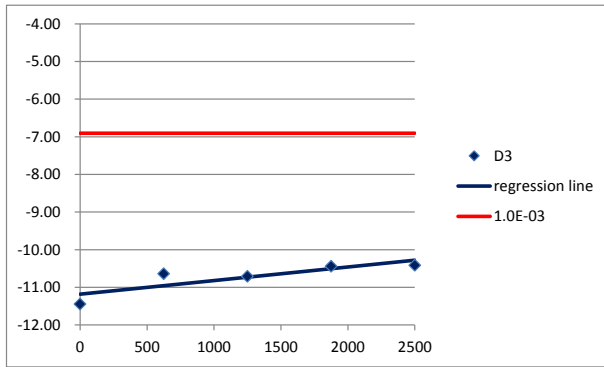
4) 70°C/75%RH



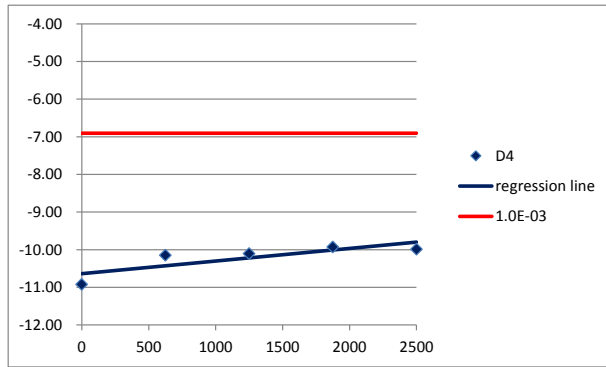
[Figure 2-2-61] D1



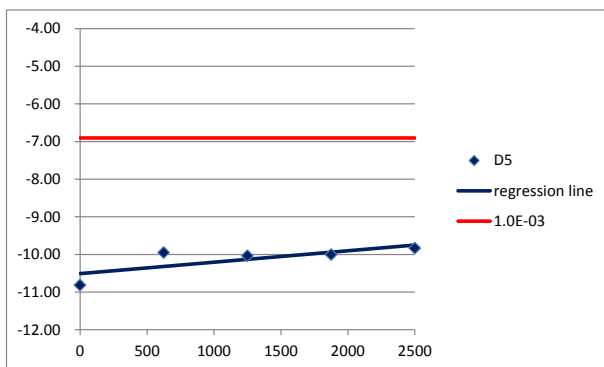
[Figure 2-2-62] D2



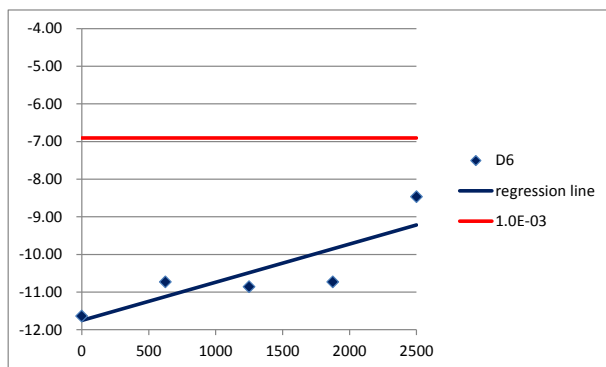
[Figure 2-2-63] D3



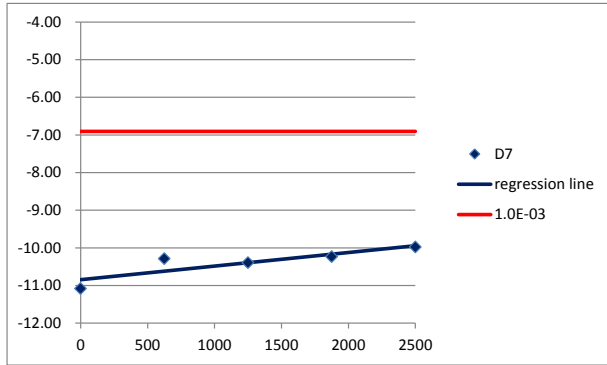
[Figure 2-2-64] D4



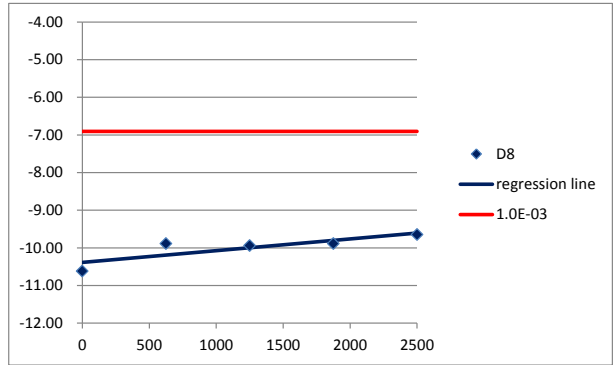
[Figure 2-2-65] D5



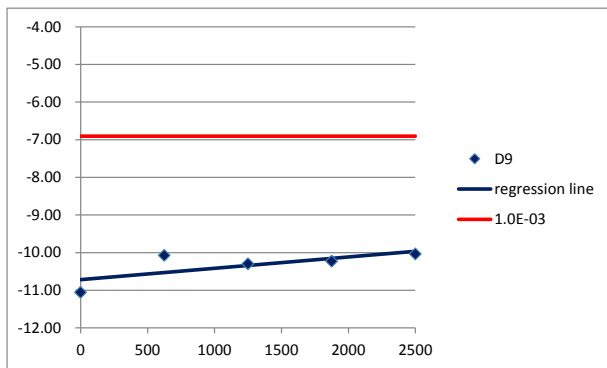
[Figure 2-2-66] D6



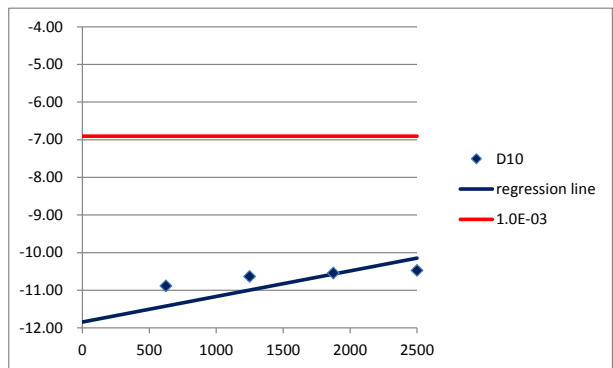
[Figure 2-2-67] D7



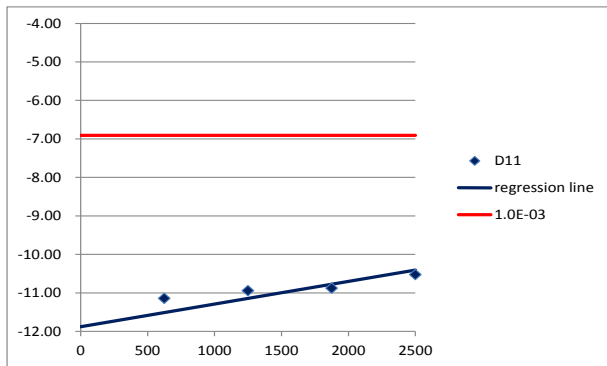
[Figure 2-2-68] D8



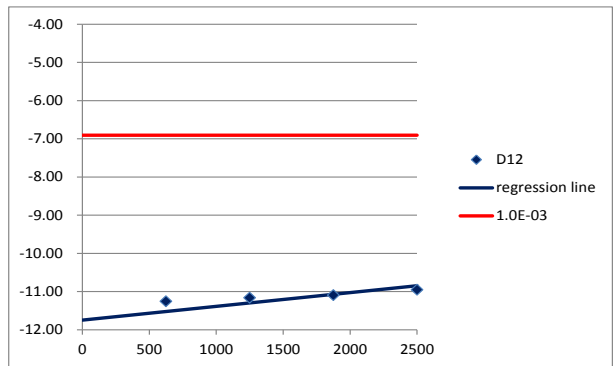
[Figure 2-2-69] D9



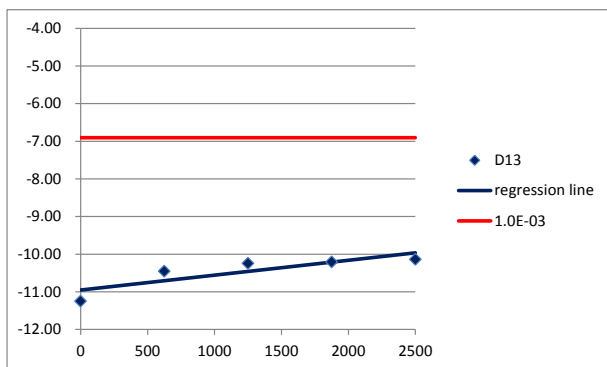
[Figure 2-2-70] D10



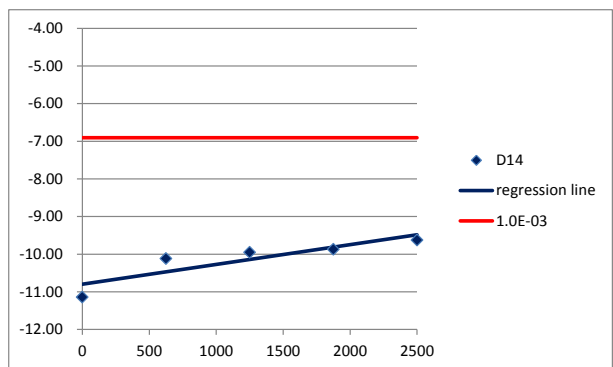
[Figure 2-2-71] D11



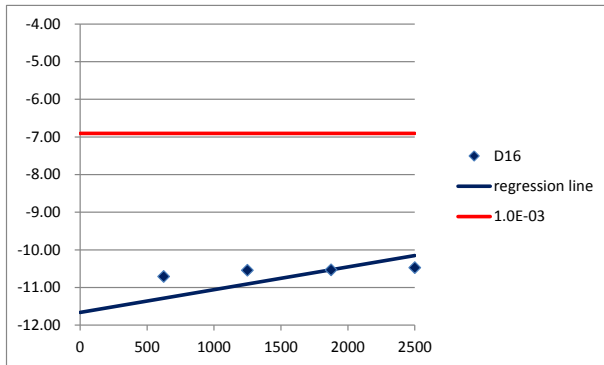
[Figure 2-2-72] D12



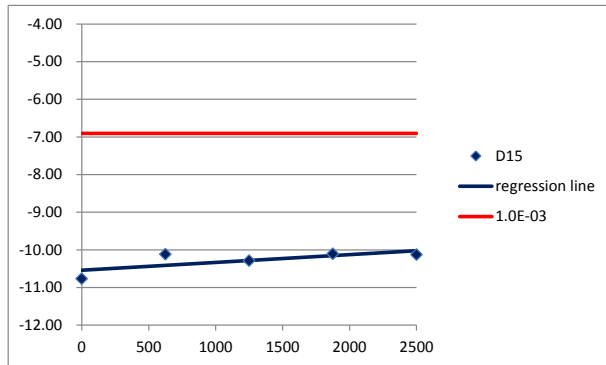
[Figure 2-2-73] D13



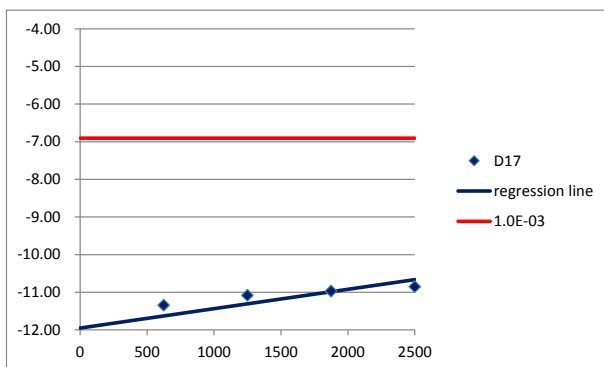
[Figure 2-2-74] D14



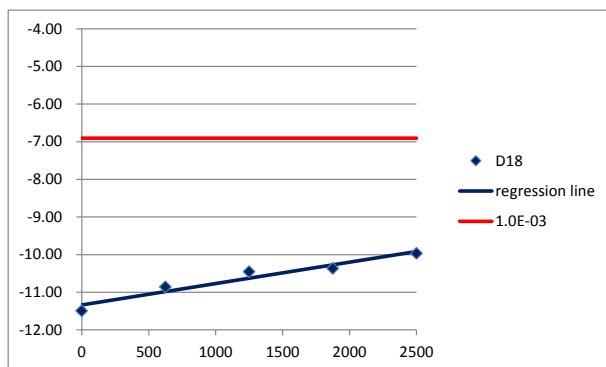
[Figure 2-2-75] D15



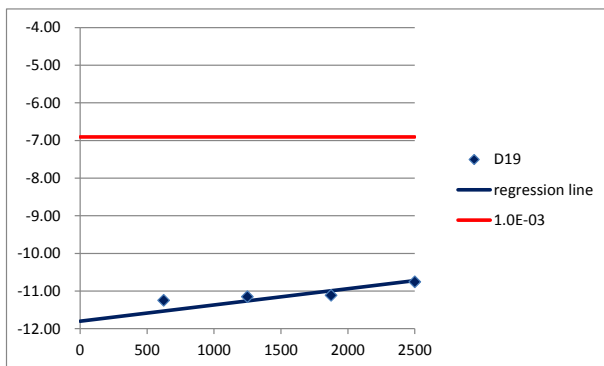
[Figure 2-2-76] D16



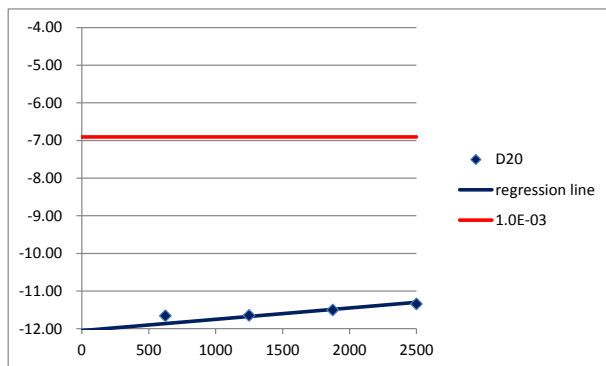
[Figure 2-2-77] D17



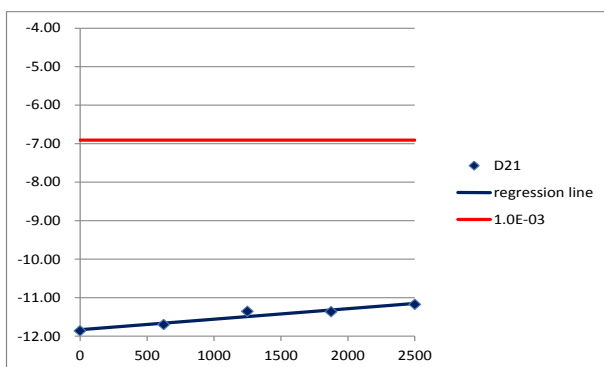
[Figure 2-2-78] D18



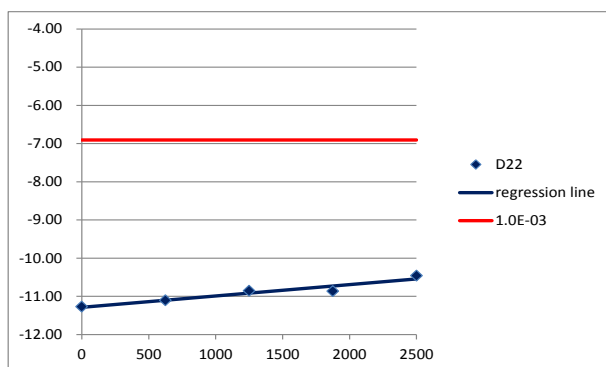
[Figure 2-2-79] D19



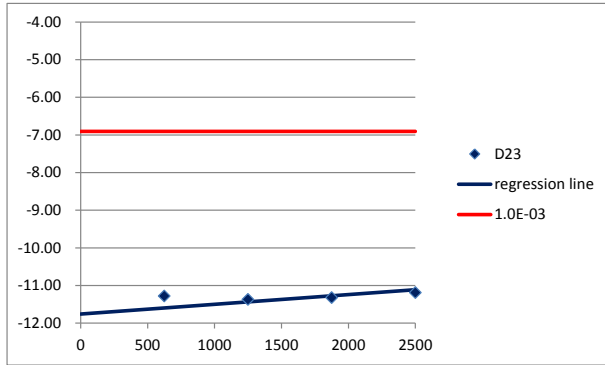
[Figure 2-2-80] D20



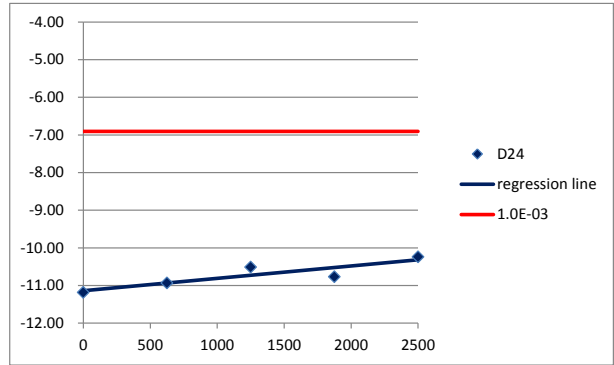
[Figure 2-2-81] D21



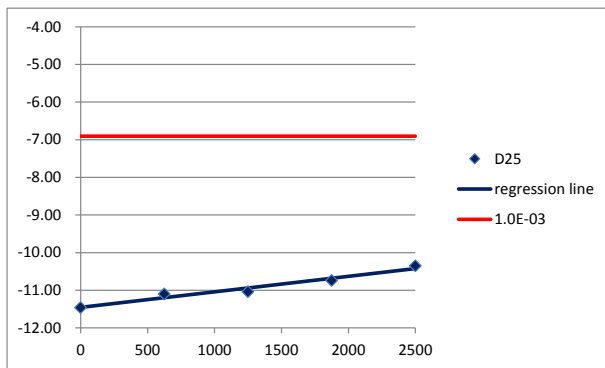
[Figure 2-2-82] D22



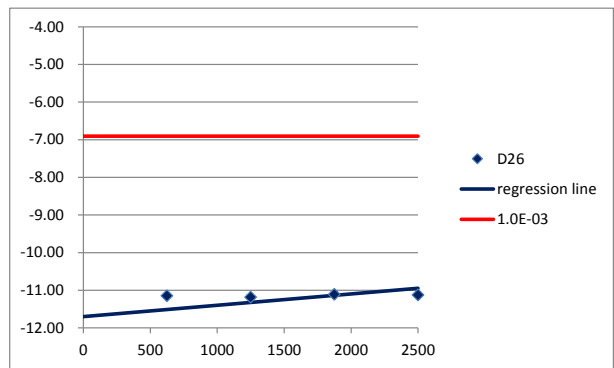
[Figure 2-2-83] D23



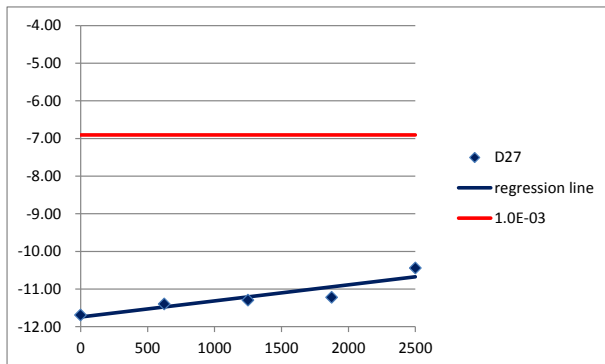
[Figure 2-2-84] D24



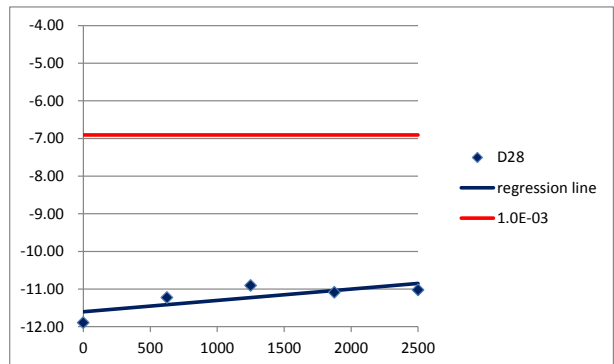
[Figure 2-2-85] D25



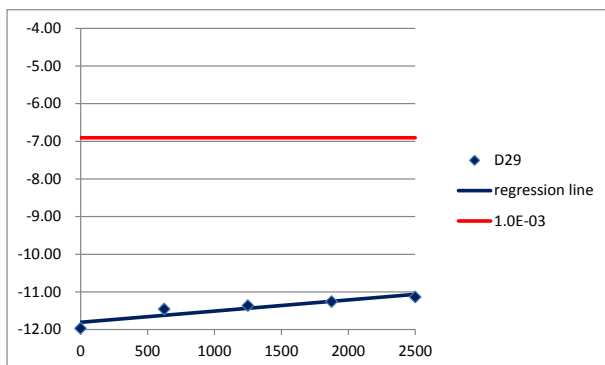
[Figure 2-2-86] D26



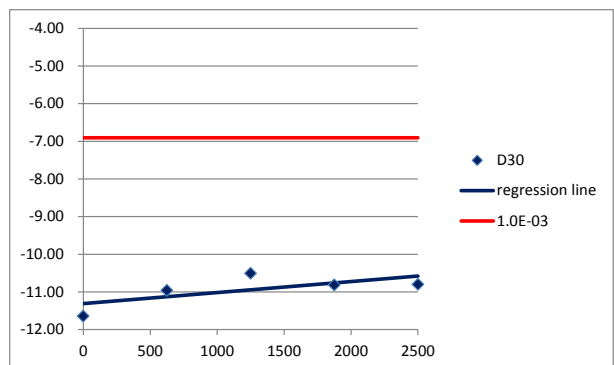
[Figure 2-2-87] D27



[Figure 2-2-88] D28



[Figure 2-2-89] D29



[Figure 2-2-90] D30

[Table 2-2-1] shows the result of “Step 2 of A.2.1”.

[Table 2-2-1]

Conditions	Check	If No, that specimen is posted.
The best-fit line increases monotonously.	Yes	-
All $\ln[\text{Error}_i]$ are almost on the best-fit line.	No	A19, C14, C19, D6, D10
The best-fit line has reasonable increase and is not flat nor having a negative slope.	Yes	-

The time-to-failure is not determined because the three conditions are not satisfied from the result of the “Step 2”. Proceed in the “Step 4 specified in A2.2”, because the result of the “Step2” shall be deemed to be “the second case specified in A.2.1”.

2-3 Judgment of complete data

The time-to-failure of each specimen of a stress condition is calculated from the slope and intercept of the regression as the time at which the specimen would have a Max RSER of  $10^{-3}$ .

Order the time-to-failure values by increasing incubation time and calculate the median rank of each specimen for each time-to-failure.

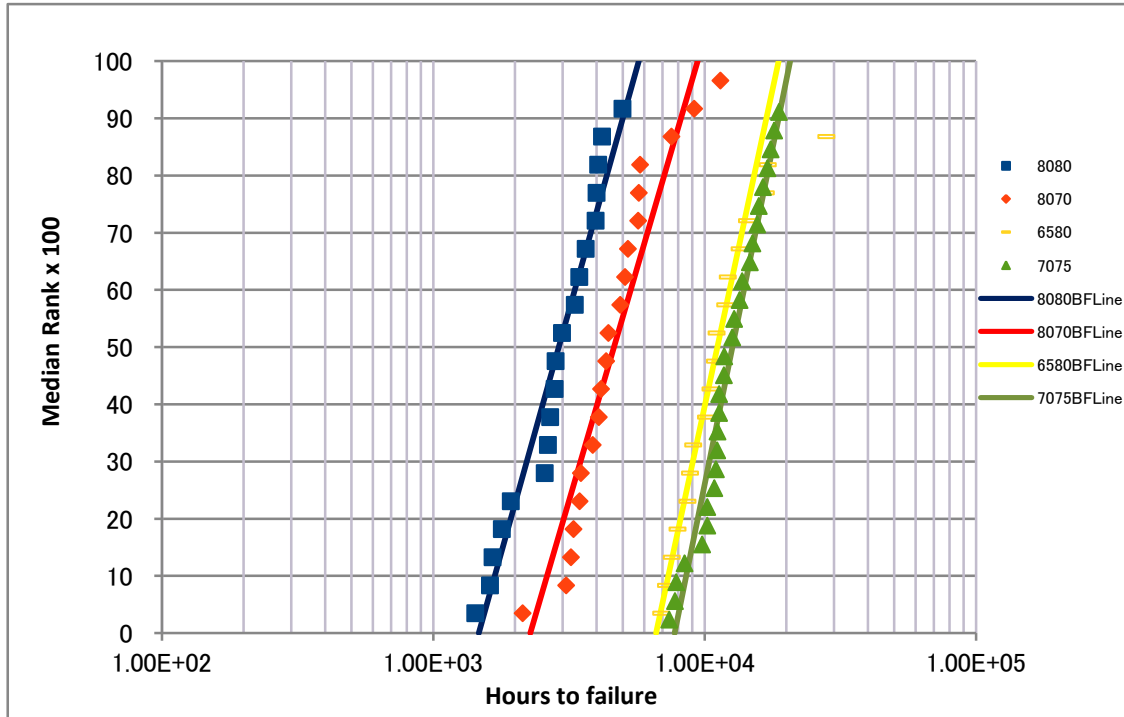
There are specimens that do not deteriorate within the minimum total incubation-time. According to the “Step 4” the missing time-to-failure of the specimens are given the median rank larger than that of the longest time-to-failure.

[Table 2-3-1] shows the ordered time-to-failure,  $\ln[\text{time-to-failure}]$  and Median rank for each specimen of the stress condition.

[Table 2-3-1]

Group A	80°C/80%RH			Group B	80°C/70%RH			Group C	65°C/80%RH			Group D	70°C/75%RH		
Order number	Time-to-failure	$\ln(H)$	Median rank	Order number	Time-to-failure	$\ln(H)$	Median rank	Order number	Time-to-failure	$\ln(H)$	Median rank	Order number	Time-to-failure	$\ln(H)$	Median rank
1	1429	7.2647	0.0343	1	2141	7.6690	0.0343	1	6927	8.8432	0.0343	1	7414	8.9111	0.0230
2	1623	7.3920	0.0833	2	3097	8.0382	0.0833	2	7222	8.8849	0.0833	2	7799	8.9618	0.0559
3	1657	7.4128	0.1324	3	3220	8.0771	0.1324	3	7578	8.9330	0.1324	3	7884	8.9726	0.0888
4	1792	7.4911	0.1814	4	3294	8.0999	0.1814	4	7970	8.9834	0.1814	4	8460	9.0431	0.1217
5	1935	7.5679	0.2304	5	3465	8.1505	0.2304	5	8652	9.0655	0.2304	5	9801	9.1902	0.1546
6	2577	7.8544	0.2794	6	3506	8.1622	0.2794	6	8844	9.0875	0.2794	6	10236	9.2337	0.1875
7	2649	7.8819	0.3284	7	3876	8.2626	0.3284	7	9086	9.1145	0.3284	7	10258	9.2358	0.2204
8	2703	7.9021	0.3775	8	4080	8.3139	0.3775	8	10149	9.2251	0.3775	8	10886	9.2952	0.2533
9	2807	7.9399	0.4265	9	4158	8.3328	0.4265	9	10527	9.2617	0.4265	9	11018	9.3073	0.2862
10	2826	7.9466	0.4755	10	4341	8.3759	0.4755	10	10949	9.3010	0.4755	10	11145	9.3187	0.3191
11	2983	8.0007	0.5245	11	4430	8.3962	0.5245	11	11076	9.3125	0.5245	11	11191	9.3229	0.3520
12	3330	8.1107	0.5735	12	4896	8.4962	0.5735	12	11928	9.3866	0.5735	12	11317	9.3341	0.3849
13	3457	8.1482	0.6225	13	5105	8.5380	0.6225	13	12195	9.4088	0.6225	13	11330	9.3352	0.4178
14	3654	8.2036	0.6716	14	5227	8.5616	0.6716	14	13495	9.5101	0.6716	14	11812	9.3769	0.4507
15	3975	8.2878	0.7206	15	5707	8.6494	0.7206	15	14333	9.5703	0.7206	15	11826	9.3781	0.4836
16	4004	8.2950	0.7696	16	5724	8.6524	0.7696	16	16844	9.7317	0.7696	16	12667	9.4468	0.5164
17	4058	8.3084	0.8186	17	5792	8.6642	0.8186	17	17130	9.7486	0.8186	17	12889	9.4641	0.5493
18	4195	8.3416	0.8676	18	7559	8.9305	0.8676	18	28173	10.2461	0.8676	18	13478	9.5088	0.5822
19	4986	8.5144	0.9167	19	9167	9.1234	0.9167	19				19	13770	9.5302	0.6151
20				20	11454	9.3461	0.9657	20				20	14715	9.5966	0.6480
												21	15033	9.6180	0.6809
												22	15637	9.6574	0.7138
												23	15850	9.6709	0.7467
												24	16453	9.7083	0.7796
												25	17072	9.7452	0.8125
												26	17553	9.7730	0.8454
												27	18073	9.8022	0.8783
												28	18810	9.8421	0.9112
												29			
												30			

[Figure 2-3-1] shows the lognormal graph of the median rank versus the time-to-failure for each specimen of the stress group.



[Figure 2-3-1] Best-fit lines specimen groups A,B,C,D on lognormal paper

Judge complete data by “the two conditions specified in Step6 in A.2.2”.

[Table 2-3-2] shows the result of “Step 6”.

[Table 2-3-2]

Conditions	Check	If No, that specimen is posted.
a) All the time-to-failure corresponding to each median rank are almost on the best-fit straight-line of each stress group.	No.	Group A: 6; Group B: 2, 3, 16, 17, 20; Group C:18
b) The best-fit straight lines of all stress groups are reasonably parallel with each other.	Yes	

There are specimens whose time-to-failure are away from the best-fit straight line.

These time-to-failure are not used for the lifetime estimation and are treated as missing time-to-failure.

Since condition b) is satisfied, proceed in the “Step 7 of A.2.3”.

#### 2-4 Condition for lifetime estimation effectiveness

Check the tree conditions and judge the effectiveness of the time-to-failure.

[Table 2-4-1] shows the result of “Step 7”.

[Table 2-4-1]

Conditions	Check
a) The lognormal data plots of each stress group are almost on the time-to-failure.	Yes.
b) Exclude the missing time-to-failure, then check the specimens of each stress group have effective time-to-failure that span over one-half of a median rank point.	Yes.
c) The best-fit straight lines of all stress groups are reasonably parallel with one another.	Yes.

Since these tree conditions are satisfied, the lifetime distribution shall be lognormal.

As specified in "A.2.4", it is the case that lifetime distribution is lognormal but missing time-to-failure exists.

Because of the above reason, the substitution method for missing time-to-failure is available.

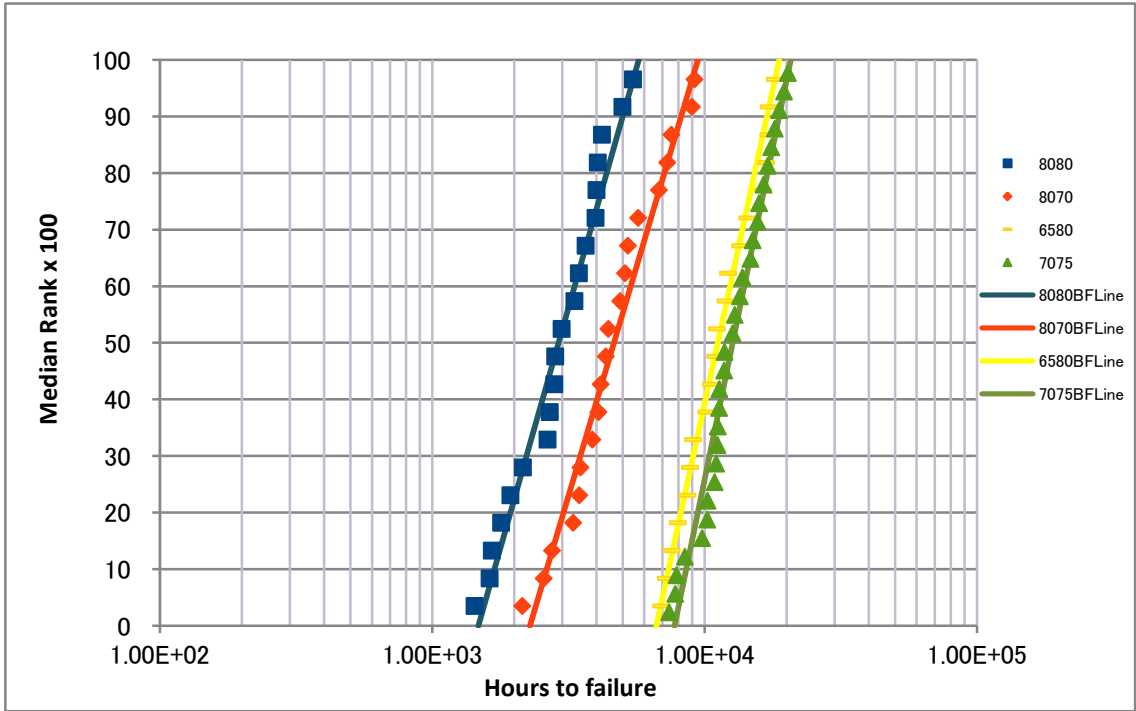
[Table 2-4-2] shows the result that all the missing time-to-failure are substituted.

[Table 2-4-2]

Group A			Group B			Group C			Group D						
Order number	Time-to-failure	ln (H)	Median rank	Order number	Time-to-failure	ln (H)	Median rank	Order number	Time-to-failure	ln (H)	Median rank	Order number	Time-to-failure	ln (H)	Median rank
1	1429	7.2647	0.034	1	2141	7.6690	0.034	1	6927	8.8432	0.034	1	7414	8.9111	0.023
2	1623	7.3920	0.083	2	2568	7.8507	0.083	2	7222	8.8849	0.083	2	7799	8.9618	0.056
3	1657	7.4128	0.132	3	2753	7.9203	0.132	3	7578	8.9330	0.132	3	7884	8.9726	0.089
4	1792	7.4911	0.181	4	3294	8.0999	0.181	4	7970	8.9834	0.181	4	8460	9.0431	0.122
5	1935	7.5679	0.230	5	3465	8.1505	0.230	5	8652	9.0655	0.230	5	9801	9.1902	0.155
6	2153	7.6744	0.279	6	3506	8.1622	0.279	6	8844	9.0875	0.279	6	10236	9.2337	0.188
7	2649	7.8819	0.328	7	3876	8.2626	0.328	7	9086	9.1145	0.328	7	10258	9.2358	0.220
8	2703	7.9021	0.377	8	4080	8.3139	0.377	8	10149	9.2251	0.377	8	10886	9.2952	0.253
9	2807	7.9399	0.426	9	4158	8.3328	0.426	9	10527	9.2617	0.426	9	11018	9.3073	0.286
10	2826	7.9466	0.475	10	4341	8.3759	0.475	10	10949	9.3010	0.475	10	11145	9.3187	0.319
11	2983	8.0007	0.525	11	4430	8.3962	0.525	11	11076	9.3125	0.525	11	11191	9.3229	0.352
12	3330	8.1107	0.574	12	4896	8.4962	0.574	12	11928	9.3866	0.574	12	11317	9.3341	0.385
13	3457	8.1482	0.623	13	5105	8.5380	0.623	13	12195	9.4088	0.623	13	11330	9.3352	0.418
14	3654	8.2036	0.672	14	5227	8.5616	0.672	14	13495	9.5101	0.672	14	11812	9.3769	0.451
15	3975	8.2878	0.721	15	5707	8.6494	0.721	15	14333	9.5703	0.721	15	11826	9.3781	0.484
16	4004	8.2950	0.770	16	6799	8.8246	0.770	16	16353	9.7022	0.770	16	12667	9.4468	0.516
17	4058	8.3084	0.819	17	7289	8.8942	0.819	17	16844	9.7317	0.819	17	12889	9.4641	0.549
18	4195	8.3416	0.868	18	7559	8.9305	0.868	18	17130	9.7486	0.868	18	13478	9.5088	0.582
19	4986	8.5144	0.917	19	8981	9.1028	0.917	19	17208	9.7531	0.917	19	13770	9.5302	0.615
20	5457	8.6047	0.966	20	9167	9.1234	0.966	20	18108	9.8041	0.966	20	14715	9.5966	0.648
												21	15033	9.6180	0.681
												22	15637	9.6574	0.714
												23	15850	9.6709	0.747
												24	16453	9.7083	0.780
												25	17072	9.7452	0.813
												26	17553	9.7730	0.845
												27	18073	9.8022	0.878
												28	18810	9.8421	0.911
												29	19569	9.8817	0.944
												30	20211	9.9140	0.977
Mean	3084	8.0339		Mean	4967	8.5106		Mean	11829	9.3783		Mean	13139	9.4833	

[Figure 2-4-1] shows the best-fit lines of specimen groups A,B,C and D (substitution method is applied).





[Figure 2-4-1]

3 Lifetime estimation calculation method

3-1 Maximum-likelihood method with least-squares method

Calculate the multiple regression coefficients and standard error using the least-squares method across all time-to-failure.

[Table 3-1-1] shows the estimated regression coefficients and the estimated log standard deviation.

[Table 3-1-1]

Estimated regression coefficients			Estimated log standard deviation
$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\sigma}_{lsm}$
-22.4759	12531.08	-0.06354	0.37093

Calculate  $B_{50}$  Life,  $B_5$  Life and 95% lower confidence bound of  $B_5$  Life ( $= (B_5 \text{ Life})_L$ ) at the Controlled storage condition using the multiple regression-coefficients and standard error obtained by the least-squares method and the equations of maximum-likelihood method.

[Table 3-1-2] shows the  $B_{50}$  Life,  $B_5$  Life and 95% lower confidence bound of  $B_5$  Life ( $= (B_5 \text{ Life})_L$ ).

[Table 3-1-2]

$B_{50}$ Life	Hours	12948257
	Years	1477
$B_5$ Life	Hours	7047240
	Years	804
$(B_5 \text{ Life})_L$	Hours	2834356
	Years	323

3-2 Acceleration-factor method

Calculate regression coefficients using the log-mean failure time.

[Table 3-2-1] shows the log-mean failure time for each stress condition.

[Table 3-2-1]

Group	Log-mean	Temp.	1/T(Kelvin)	Humidity
A	8.0339	80	0.002831658	80
B	8.5106	80	0.002831658	70
C	9.3783	65	0.002957267	80
D	9.4833	70	0.002914177	75

Calculate acceleration factors from the difference between the estimated log-mean at each stress condition.

[Table 3-2-2] shows the calculated lifetime and the accelerated factors for each stress condition.

[Table 3-2-2]

Stress condition		Calculated lifetime		Acceleration factors
°C	%RH	Ln(Lifetime)	Lifetime (hours)	
80	80	8.0033	2991	3135
80	70	8.6063	5466	1715
65	80	9.5042	13415	699
70	75	9.2908	10838	865
25	50	16.0536	9375710	

Calculate the normalized time-to-failure at the Controlled storage condition for each specimen group using the acceleration factors, and plot these data on a lognormal graph.

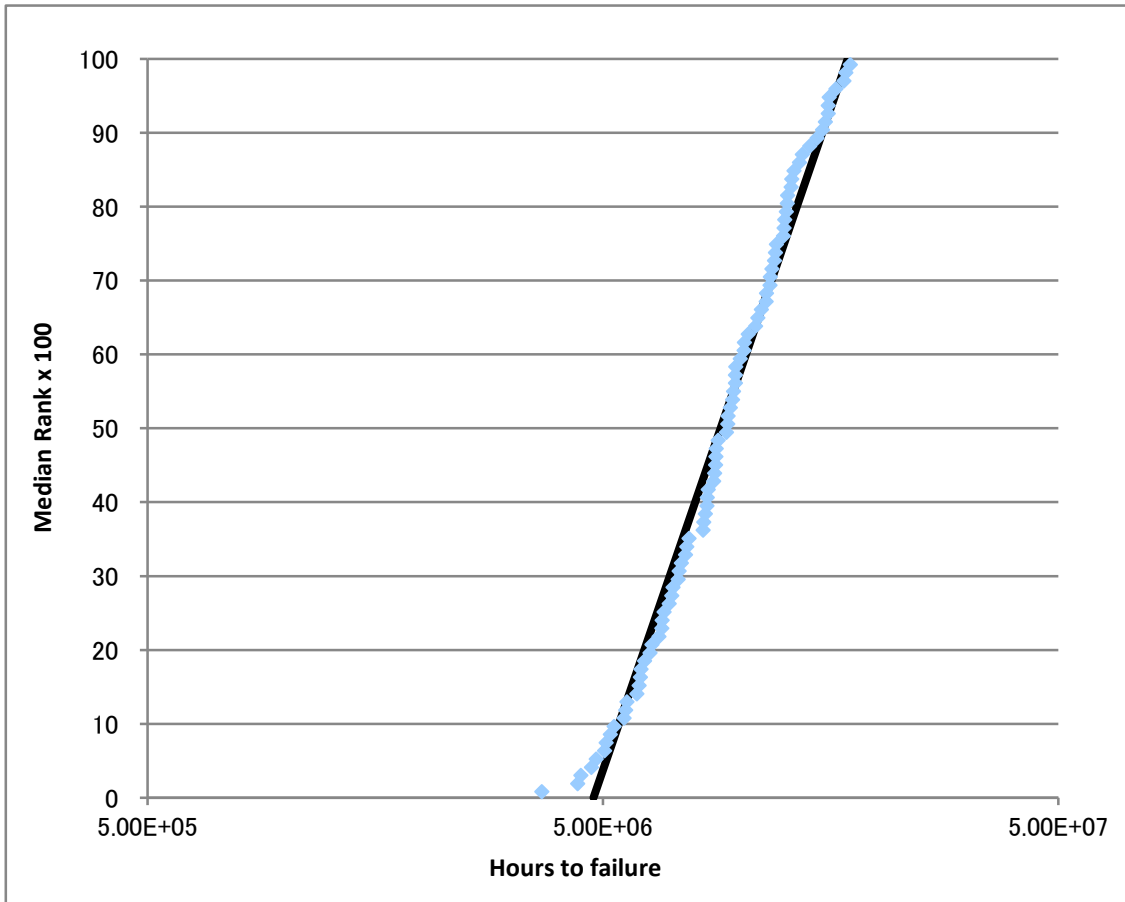
[Table 3-2-3] shows the composite data and [Figure 3-2-1] shows the lognormal plot using the composite data.

[Table 3-2-3]

Time-to-failure	Group #	Normalized to 25°C50%RH	Ln	Group #	Normalized to 25°C50%RH	Order	Media rank
1429	A	4479476.25	15.32	B	3672249	1	0.0077
1623	A	5087606.69	15.44	B	4403881	2	0.0188
1657	A	5194186.25	15.46	A	4479476	3	0.0299
1792	A	5617369.80	15.54	B	4721135	4	0.0409
1935	A	6065630.89	15.62	C	4841090	5	0.0520
2153	A	6747637.38	15.72	C	5047257	6	0.0631
2649	A	8303801.67	15.93	A	5087607	7	0.0741
2703	A	8473075.09	15.95	A	5194186	8	0.0852
2807	A	8799083.16	15.99	C	5296056	9	0.0962
2826	A	8858642.33	16.00	C	5570014	10	0.1073
2983	A	9350789.12	16.05	A	5617370	11	0.1184
3330	A	10438527.58	16.16	B	5649878	12	0.1294
3457	A	10836633.59	16.20	B	5943178	13	0.1405
3654	A	11454168.10	16.25	B	6013501	14	0.1515
3975	A	12460404.54	16.34	C	6046645	15	0.1626
4004	A	12551310.64	16.35	A	6065631	16	0.1737
4058	A	12720584.06	16.36	C	6180828	17	0.1847
4195	A	13150037.00	16.39	C	6349955	18	0.1958
4986	A	15629579.13	16.56	D	6413690	19	0.2069
5457	A	17106284.45	16.65	B	6648126	20	0.2179
2141	B	3672249.11	15.12	D	6746746	21	0.2290
2568	B	4403880.54	15.30	A	6747637	22	0.2400

2753	B	4721134.77	15.37	D	6820277	23	0.2511
3294	B	5649877.89	15.55	B	6998027	24	0.2622
3465	B	5943177.56	15.60	C	7092857	25	0.2732
3506	B	6013500.87	15.61	B	7131813	26	0.2843
3876	B	6648125.89	15.71	D	7318562	27	0.2954
4080	B	6998027.26	15.76	C	7357031	28	0.3064
4158	B	7131813.07	15.78	B	7445695	29	0.3175
4341	B	7445695.18	15.82	B	7598348	30	0.3285
4430	B	7598348.22	15.84	C	7651955	31	0.3396
4896	B	8397632.71	15.94	C	7740712	32	0.3507
5105	B	8756110.09	15.99	A	8303802	33	0.3617
5227	B	8965364.82	16.01	C	8336151	34	0.3728
5707	B	9788662.15	16.10	B	8397633	35	0.3838
6799	B	11662393.39	16.27	A	8473075	36	0.3949
7289	B	12502548.70	16.34	D	8478632	37	0.4060
7559	B	12965217.66	16.38	C	8522750	38	0.4170
8981	B	15403916.65	16.55	B	8756110	39	0.4281
9167	B	15723263.69	16.57	A	8799083	40	0.4392
6927	C	4841089.75	15.39	D	8854941	41	0.4502
7222	C	5047257.13	15.43	A	8858642	42	0.4613
7578	C	5296055.74	15.48	D	8873973	43	0.4723
7970	C	5570013.76	15.53	B	8965365	44	0.4834
8652	C	6046644.79	15.62	A	9350789	45	0.4945
8844	C	6180828.31	15.64	D	9417242	46	0.5055
9086	C	6349955.46	15.66	C	9431284	47	0.5166
10149	C	7092856.91	15.77	D	9531433	48	0.5277
10527	C	7357030.72	15.81	D	9641298	49	0.5387
10949	C	7651954.91	15.85	D	9681091	50	0.5498
11076	C	7740711.71	15.86	B	9788662	51	0.5608
11928	C	8336151.08	15.94	D	9790091	52	0.5719
12195	C	8522750.03	15.96	D	9801337	53	0.5830
13495	C	9431284.27	16.06	C	10016939	54	0.5940
14333	C	10016939.42	16.12	D	10218305	55	0.6051
16353	C	11428830.07	16.25	D	10230416	56	0.6162
16844	C	11771808.24	16.28	A	10438528	57	0.6272
17130	C	11971685.78	16.30	A	10836634	58	0.6383
17208	C	12026377.62	16.30	D	10957947	59	0.6493
18108	C	12655167.49	16.35	D	11149994	60	0.6604

7414	D	6413690.49	15.67	C	11428830	61	0.6715
7799	D	6746745.64	15.72	A	11454168	62	0.6825
7884	D	6820277.29	15.74	D	11659525	63	0.6936
8460	D	7318562.39	15.81	B	11662393	64	0.7046
9801	D	8478632.39	15.95	C	11771808	65	0.7157
10236	D	8854941.45	16.00	D	11912128	66	0.7268
10258	D	8873973.17	16.00	C	11971686	67	0.7378
10886	D	9417242.34	16.06	C	12026378	68	0.7489
11018	D	9531432.67	16.07	A	12460405	69	0.7600
11145	D	9641297.62	16.08	B	12502549	70	0.7710
11191	D	9681091.22	16.09	A	12551311	71	0.7821
11317	D	9790091.08	16.10	C	12655167	72	0.7931
11330	D	9801337.10	16.10	A	12720584	73	0.8042
11812	D	10218304.84	16.14	D	12729627	74	0.8153
11826	D	10230415.94	16.14	B	12965218	75	0.8263
12667	D	10957946.79	16.21	D	13004722	76	0.8374
12889	D	11149994.17	16.23	A	13150037	77	0.8485
13478	D	11659525.28	16.27	D	13527229	78	0.8595
13770	D	11912128.15	16.29	D	13711491	79	0.8706
14715	D	12729627.14	16.36	D	14233133	80	0.8816
15033	D	13004722.04	16.38	D	14768617	81	0.8927
15637	D	13527229.33	16.42	D	15184719	82	0.9038
15850	D	13711491.00	16.43	B	15403917	83	0.9148
16453	D	14233133.22	16.47	A	15629579	84	0.9259
17072	D	14768616.68	16.51	D	15634560	85	0.9369
17553	D	15184719.34	16.54	B	15723264	86	0.9480
18073	D	15634560.06	16.56	D	16272123	87	0.9591
18810	D	16272122.76	16.60	D	16928465	88	0.9701
19569	D	16928464.80	16.64	A	17106284	89	0.9812
20211	D	17483886.62	16.67679	D	17483886.62	90	0.992257
		Mean	16.02	Total		90	
		Deviation	0.36577				



[Figure 3-2-1]

Calculate  $B_{50}$  Life,  $B_5$  Life and the point estimates of the 5 percentile with variation ( $=B_{5V}$  Life) at the Controlled storage-condition using  $\hat{\alpha}$  and  $\hat{\sigma}$  obtained from the fitting line.

[Table 3-2-4] shows the  $B_{50}$  Life,  $B_5$  Life and  $B_{5V}$  Life.

[Table 3-2-4]

$B_{50}$ Life	Hours	9062837
	Years	1034
$B_5$ Life	Hours	4974457
	Years	567
$B_{5V}$ Life	Hours	2730405
	Years	311

#### 4 Result

[Table 4-1] shows the  $(B_5 \text{ Life})_L$  and the  $B_{5V}$  Life.

The difference between the  $(B_5 \text{ Life})_L$  and  $B_{5V}$  Life is small.

We decide that this aging test to estimate the lifetime of the disk at the Controlled storage condition is reliable.

[Table 4-1]

$(B_5 \text{ Life})_L$	$B_{5V}$ Life
323 years	311 years

## 5 Conclusion

Since the estimated lifetime is more than 30 years, ADTC certifies that the Enterprise Grade BD-R DL 50GB is an archival grade disk.