

MINIFLEX® 3-BFNH L-HD

Part No. 20660-0**E-01, 20780-0**E-01

Test Report

Product Specification no. PRS-2073

5	T24031	August 2, 2024	S.Shigekoshi	M.Muro	T.Masunaga
4	T22003	January 7, 2022	M.Muro	-	H.Ikari
3	T19124	October 1, 2019	S.Shigekoshi	M.Muro	H.Ikari
2	T16085	July 1, 2016	M.Muro	-	Y.Shimada
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

To evaluate the performance of MINIFLEX 3-BFNH L-HD Connector in accordance with PRS-2073.

2. Specimen

(1) Connector : MINIFLEX 3-BFNH L-HD (P/N 20660-0**E-01)
MINIFLEX 3-BFNH L-HD-B (P/N 20780-0**E-01)

(2) FPC : TAIYO TECHNOLEX CO.,LTD.

Thickness Lead : $t=0.20\pm 0.03$ (Actual measurement : 0.19~0.20mm)

3. Test Sequence

All the evaluations were performed in accordance with Table 1. Test Sequence.

4. Result

See Table 2-1~2-6, Graph 1~14. For the details of the testing conditions and requirements, see PRS-2073.
The "n" in the tables show the number of measurement points.

5. Conclusion

All the specimens met the requirements of PRS-2073.

Table 1 Test Sequence

Test Items	Group															
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
C/T Resistance	2,7			1,3,5	1,3	1,3	1,3	1,5	1,5	1,3	1,3	1,3	1,3			
D.W.Voltage								2,6	2,6							
Insulation Resistance								3,7	3,7							
Temp. rising																1
Act Locking Force	1,5															
Act Un-locking Force	3,6															
FPC Retention Force		1,3														
Durability	4	2														
C/T Retention Force			1													
Vibration				2												
Shock				4												
Fretting corrosion					2											
Thermal Shock						2										
High Temp. Life							2									
High Temp & High Hum energizing								4								
High Temp & High Hum Life									4							
Cold Temp. Life										2						
Gas (H ₂ S)											2					
Gas (SO ₂)												2				
Salt Water Spray													2			
Solderability														1		
Soldering Heat Resist.															1	

※The number of group is test sequence.

Table 2-1 Test Result

Test Item	Measurement		Spec.	Set	n	Data					Judge	
						AVE.(X)	MAX.	MIN.	s	X±3s		
A Group Durability	Contact Resistance (mΩ)	※T	Initial	60mΩ MAX.	5	305	26.918	35.65	17.41	4.717	41.069	○
		After 20th	ΔR=40mΩ MAX.	-0.443			6.03	-6.96	3.137	8.968	○	
		※B	Initial	60mΩ MAX.	5	305	21.740	32.74	11.82	6.439	41.057	○
		After 20th	ΔR=40mΩ MAX.	-0.066			6.64	5.98	3.144	9.366	○	
	Act Locking Force (N)	31P	Initial	7.595N MAX. (0.245N/Pos. ×31P)	5	5	2.688 (0.087)	2.86 (0.09)	2.55 (0.08)	0.131 (0.004)	3.081 (0.099)	○
			20th cycles				2.362 (0.076)	2.55 (0.08)	2.29 (0.07)	0.107 (0.003)	2.683 (0.087)	○
		39P	Initial	9.555N MAX. (0.245N/Pos. ×39P)	5	5	3.336 (0.086)	3.46 (0.09)	3.16 (0.08)	0.112 (0.003)	3.672 (0.094)	○
			20th cycles				2.914 (0.075)	3.09 (0.08)	2.76 (0.07)	0.121 (0.003)	3.277 (0.084)	○
		61P	Initial	14.945N MAX. (0.245N/Pos. ×61P)	5	5	5.028 (0.082)	5.23 (0.09)	4.84 (0.08)	0.151 (0.002)	5.481 (0.090)	○
			20th cycles				4.506 (0.074)	4.61 (0.08)	4.42 (0.07)	0.068 (0.001)	4.710 (0.077)	○
		71P	Initial	17.395N MAX. (0.245N/Pos. ×71P)	5	5	5.924 (0.083)	6.10 (0.09)	5.78 (0.08)	0.117 (0.002)	6.275 (0.088)	○
			20th cycles				5.182 (0.073)	5.28 (0.07)	5.09 (0.07)	0.083 (0.001)	5.431 (0.076)	○
	Act Un-locking Force (N)	31P	Initial	0.434N MIN. (0.014N/Pos. ×31P)	5	5	1.854 (0.060)	1.98 (0.06)	1.76 (0.06)	0.082 (0.003)	1.608 (0.052)	○
			20th cycles				1.616 (0.052)	1.69 (0.05)	1.53 (0.05)	0.062 (0.002)	1.430 (0.046)	○
		39P	Initial	0.546N MIN. (0.014N/Pos. ×39P)	5	5	2.406 (0.062)	2.65 (0.07)	2.29 (0.06)	0.147 (0.004)	1.965 (0.050)	○
			20th cycles				2.102 (0.054)	2.26 (0.06)	1.96 (0.05)	0.122 (0.003)	1.736 (0.045)	○
61P		Initial	0.854N MIN. (0.014N/Pos. ×61P)	5	5	3.678 (0.060)	3.88 (0.06)	3.52 (0.06)	0.135 (0.002)	3.273 (0.054)	○	
		20th cycles				3.106 (0.051)	3.20 (0.05)	2.91 (0.05)	0.117 (0.002)	2.755 (0.045)	○	
71P		Initial	0.994N MIN. (0.014N/Pos. ×71P)	5	5	4.162 (0.059)	4.41 (0.06)	3.94 (0.06)	0.189 (0.003)	3.595 (0.051)	○	
		20th cycles				3.628 (0.051)	3.81 (0.05)	3.51 (0.05)	0.118 (0.002)	3.274 (0.046)	○	

※T : Top Contact, B : Bottom Contact

Table 2-2 Test Result

Test Item	Measurement		Spec.	Set	n	Data					Judge	
						AVE.(X)	MAX.	MIN.	s	X±3s		
B Group FPC Retention Force (N)	31P	Initial	4.03N MIN. (0.13N /Pos. ×31P)	5	5	12.778 (0.412)	13.03 (0.42)	12.59 (0.41)	0.185 (0.006)	12.223 (0.394)	○	
		After 20th	3.10N MIN. (0.10N /Pos. ×31P)			11.626 (0.375)	11.78 (0.38)	11.45 (0.37)	0.121 (0.004)	11.263 (0.363)	○	
	39P	Initial	5.07N MIN. (0.13N /Pos. ×39P)	5	5	16.104 (0.413)	16.41 (0.42)	15.78 (0.40)	0.262 (0.007)	15.318 (0.393)	○	
		After 20th	3.90N MIN. (0.10N /Pos. ×39P)			14.618 (0.375)	14.85 (0.38)	14.25 (0.37)	0.257 (0.007)	13.847 (0.355)	○	
	61P	Initial	7.93N MIN. (0.13N /Pos. ×61P)	5	5	25.252 (0.414)	25.53 (0.42)	24.84 (0.41)	0.282 (0.005)	24.406 (0.400)	○	
		After 20th	6.10N MIN. (0.10N /Pos. ×61P)			22.640 (0.371)	22.96 (0.38)	22.18 (0.36)	0.302 (0.005)	21.734 (0.356)	○	
	71P	Initial	9.23N MIN. (0.13N /Pos. ×71P)	5	5	29.154 (0.411)	29.54 (0.42)	28.44 (0.40)	0.424 (0.006)	27.882 (0.393)	○	
		After 20th	7.10N MIN. (0.10N /Pos. ×71P)			26.446 (0.372)	27.02 (0.38)	25.99 (0.37)	0.408 (0.006)	25.222 (0.355)	○	
C Group Retention Force (N)	Contact		0.3N MIN.	5	30	0.690	0.87	0.53	0.091	0.417	○	
D Group Vibration Shock	Contact Resistance (mΩ)	※T	Initial	5	305	60mΩ MAX.	26.916	36.62	17.64	4.674	40.938	○
			After Vibration			ΔR=40mΩ MAX.	-0.025	5.73	-5.89	2.838	8.489	○
			After Shock			ΔR=40mΩ MAX.	-0.180	6.39	-6.48	3.357	9.891	○
	Contact Resistance (mΩ)	※B	Initial	5	305	60mΩ MAX.	21.708	32.73	11.62	6.355	40.773	○
			After Vibration			ΔR=40mΩ MAX.	-0.065	6.44	-6.80	3.189	9.502	○
			After Shock			ΔR=40mΩ MAX.	0.067	6.41	-5.94	3.167	9.568	○
	Discontinuity	In Vibration	1μsec. MAX.	10	10	No Discontinuity					○	
		In Shock				No Discontinuity					○	
Appearance	After Vibration	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○		
	After Shock				No Abnormality					○		

※T : Top Contact, B : Bottom Contact

Table 2-3 Test Result

Test Item	Measurement		Spec.	Set	n	Data					Judge	
						AVE.(X)	MAX.	MIN.	s	X±3s		
E Group Fretting corrosion	Contact Resistance (mΩ)	T	Initial	60mΩ MAX.	5	305	27.185	36.33	17.68	4.578	40.919	○
			After Test	ΔR=40mΩ MAX.			-0.822	6.10	-6.29	3.313	9.117	○
		B	Initial	60mΩ MAX.	5	305	21.729	32.26	11.98	5.890	39.399	○
			After Test	ΔR=40mΩ MAX.			-0.054	6.73	-6.27	3.109	9.273	○
	Discontinuity		In Test	1μsec. MAX.	10	10	No Discontinuity					○
	Appearance		After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○
F Group Thermal Shock	Contact Resistance (mΩ)	T	Initial	60mΩ MAX.	5	305	26.682	35.11	17.59	4.479	40.119	○
			After Test	ΔR=40mΩ MAX.			0.174	5.73	-5.95	3.284	10.026	○
		B	Initial	60mΩ MAX.	5	305	21.832	32.26	11.62	6.455	41.197	○
			After Test	ΔR=40mΩ MAX.			-0.371	6.94	-6.86	2.992	8.605	○
	Appearance		After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○
	G Group High Temp. Life	Contact Resistance (mΩ)	※T	Initial	60mΩ MAX.	5	305	27.061	35.88	17.86	4.537	40.672
After Test				ΔR=40mΩ MAX.	0.469			6.16	-5.17	3.130	9.859	○
※B			Initial	60mΩ MAX.	5	305	21.886	32.37	11.83	6.374	41.008	○
			After Test	ΔR=40mΩ MAX.			0.458	5.69	-5.37	3.126	9.836	○
Appearance		After 96h	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○	

※T : Top Contact, B : Bottom Contact

Table 2-4 Test Result

Test Item	Measurement		Spec.	Set	n	Data					Judge	
						AVE.(X)	MAX.	MIN.	s	X±3s		
H Group High Temp. & High Hum. energizing	Contact Resistance (mΩ)	T	Initial	60mΩ MAX.	5	305	27.209	36.30	18.00	4.646	41.147	○
			After Test	ΔR=40mΩ MAX.			-0.282	5.40	-6.11	3.137	9.129	○
		B	Initial	60mΩ MAX.	5	305	21.749	32.44	11.43	6.666	41.747	○
			After Test	ΔR=40mΩ MAX.			-0.364	5.46	-5.83	3.161	9.119	○
	D.W.Voltage	T	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.	5	300	No Abnormality					○
			After Test				No Abnormality					○
		B	Initial		5	300	No Abnormality					○
			After Test				No Abnormality					○
	Insulation Resistance (MΩ)	T	Initial	100MΩ MIN	5	300	MIN. 5.0×10 ⁵ MΩ					○
			After Test				MIN. 2.0×10 ⁴ MΩ					○
		B	Initial		5	300	MIN. 5.0×10 ⁵ MΩ					○
			After Test				MIN. 1.0×10 ⁴ MΩ					○
Appearance		After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○	
J Group High Temp. & High Hum. Life	Contact Resistance (mΩ)	※T	Initial	60mΩ MAX.	5	305	27.045	36.92	18.61	4.252	39.801	○
			After Test	ΔR=40mΩ MAX.			-0.302	5.40	-5.74	3.200	9.298	○
		※B	Initial	60mΩ MAX.	5	305	21.796	32.65	11.54	6.514	41.338	○
			After Test	ΔR=40mΩ MAX.			-0.381	5.14	-5.95	3.030	8.709	○
	D.W.Voltage	T	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.	5	300	No Abnormality					○
			After Test				No Abnormality					○
		B	Initial		5	300	No Abnormality					○
			After Test				No Abnormality					○
	Insulation Resistance (MΩ)	T	Initial	100MΩ MIN	5	300	MIN. 5.0×10 ⁵ MΩ					○
			After Test				MIN. 5.0×10 ⁴ MΩ					○
		B	Initial		5	300	MIN. 5.0×10 ⁵ MΩ					○
			After Test				MIN. 3.0×10 ⁴ MΩ					○
Appearance		After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○	

※T : Top Contact, B : Bottom Contact

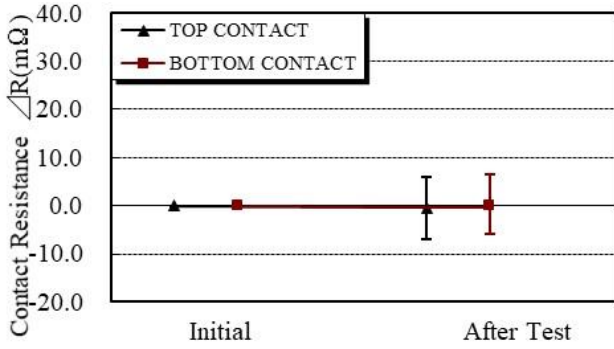
Table 2-5 Test Result

Test Item	Measurement		Spec.	Set	n	Data					Judge	
						AVE.(X)	MAX.	MIN.	s	X±3s		
K Group Cold Temp. Life	Contact Resistance (mΩ)	T	Initial	60mΩ MAX.	5	305	26.680	35.13	17.79	4.495	40.165	○
			After Test	ΔR=40mΩ MAX.			0.474	6.16	-5.22	3.136	9.882	○
		B	Initial	60mΩ MAX.	5	305	21.711	31.96	11.68	6.381	40.854	○
			After Test	ΔR=40mΩ MAX.			0.412	5.82	-5.37	3.152	9.868	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur.	5	5	No Abnormality					○	
L Group Gas (H ₂ S)	Contact Resistance (mΩ)	T	Initial	60mΩ MAX.	5	305	27.350	36.62	17.93	4.844	41.882	○
			After Test	ΔR=40mΩ MAX.			0.059	7.87	-5.71	3.271	9.872	○
		B	Initial	60mΩ MAX.	5	305	21.497	32.50	11.32	6.368	40.601	○
			After Test	ΔR=40mΩ MAX.			0.100	7.16	-6.50	3.149	9.547	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○	
M Group Gas (SO ₂)	Contact Resistance (mΩ)	※T	Initial	60mΩ MAX.	5	305	27.181	36.02	17.85	4.768	41.485	○
			After Test	ΔR=40mΩ MAX.			0.037	7.75	-7.80	3.333	10.036	○
		※B	Initial	60mΩ MAX.	5	305	21.575	32.42	11.43	6.358	40.649	○
			After Test	ΔR=40mΩ MAX.			0.041	7.52	-6.60	3.177	9.572	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○	
N Group Salt Water Spray	Contact Resistance (mΩ)	T	Initial	60mΩ MAX.	5	305	27.050	35.49	17.69	4.678	41.084	○
			After Test	ΔR=40mΩ MAX.			0.060	7.74	-7.12	3.301	9.963	○
		B	Initial	60mΩ MAX.	5	305	21.563	32.72	12.19	6.340	40.583	○
			After Test	ΔR=40mΩ MAX.			0.198	7.84	-6.97	2.954	9.060	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○	

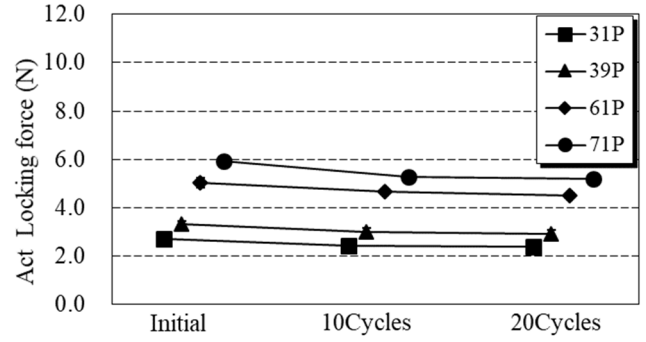
※T : Top Contact, B : Bottom Contact

Table 2-6 Test Result

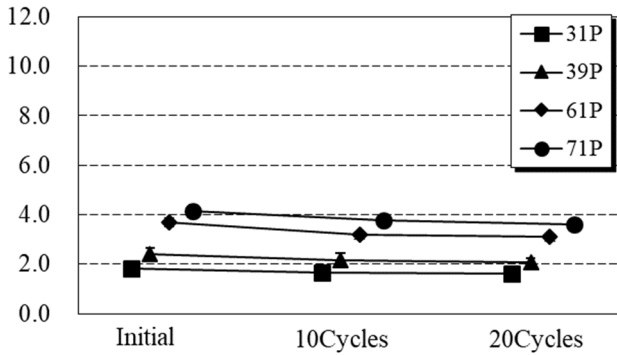
Test Item	Measurement		Spec.	Set	n	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
P Group Solderability	Zerox Time (sec.)	Contact	3sec. MAX	5	5	MAX. 0.1sec.					○
	Appearance	Contact	Wetness:95% MIN.	5	5	95%MIN.was wet.					○
Q Group Soldering Heat Resistance	Reflow twice		No abnormality adversely affecting the performance shall occur.	5	5	No Abnormality					○
	Soldering iron										
R Group Temp. rising	0.3A/Contact		ΔT=30K MAX.	5	5	MAX.ΔT=16.4K No Problem					○



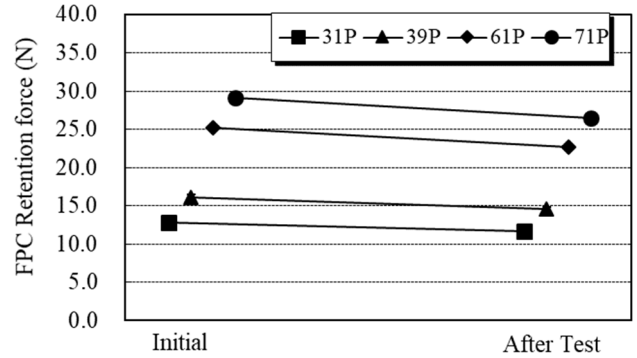
Graph.1 A change of contact resistance
A group : Durability



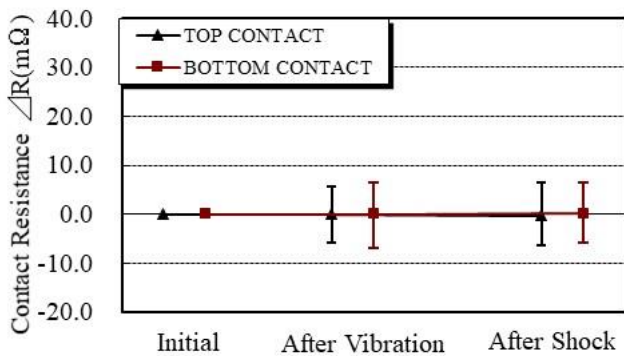
Graph.2 A change of Locking force
A group : Durability



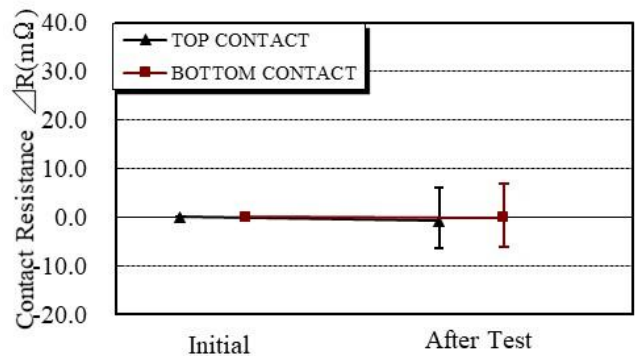
Graph.3 A change of Un-locking force
A group : Durability



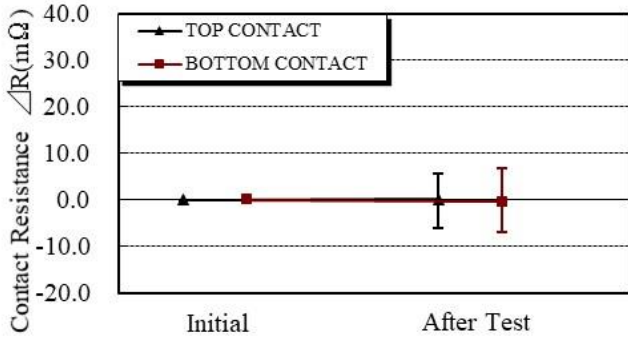
Graph.4 A change of FPC Retention force
B group : FPC Retention force



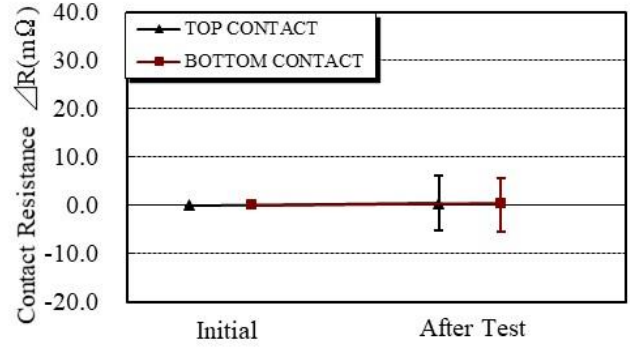
Graph.5 A change of contact resistance
D group : Vibration / Shock



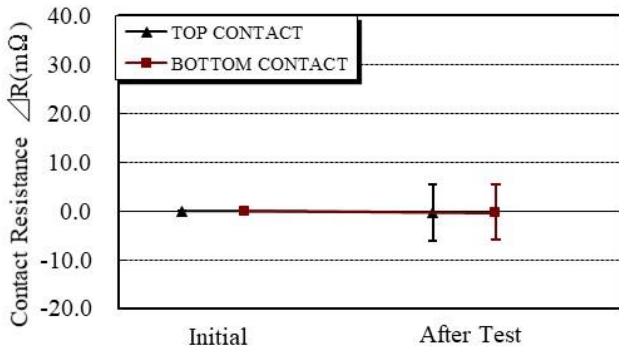
Graph.6 A change of contact resistance
E group : Fretting Corrosion



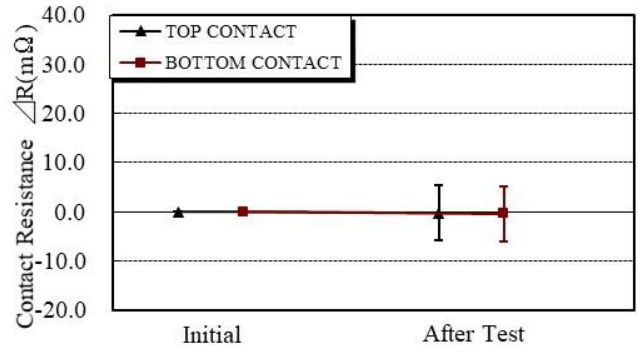
Graph.7 A change of contact resistance
F group : Thermal Shock



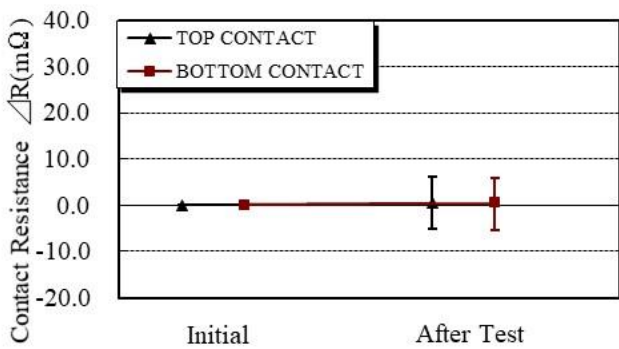
Graph.8 A change of contact resistance
G group : High Temp. Life



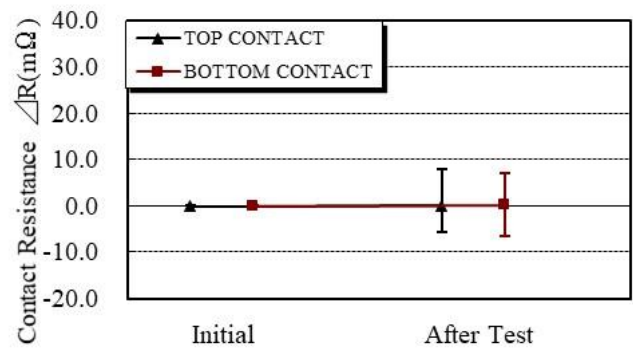
Graph.9 A change of contact resistance
H group : High Temp. & High Hum. energizing



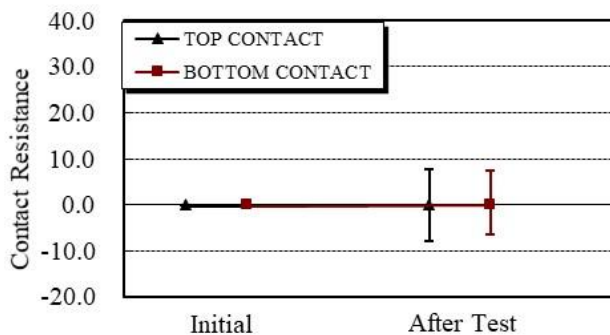
Graph.10 A change of contact resistance
J group : High Temp. & High Hum. Life



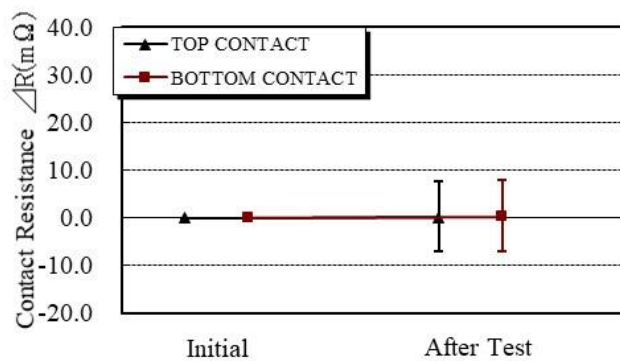
Graph.11 A change of contact resistance
K group : Cold Temp. Life



Graph.12 A change of contact resistance
L group : Gas(H₂S)



Graph.13 A change of contact resistance
M group : Gas(SO₂)



Graph.14 A change of contact resistance
N group : Salt Water Spray