

# MINIFLEX® 3-BFNH L

Part No. 20605-0\*\*E-02

## Test Report

Product Specification no. PRS-1920

5	T24026	May 30, 2024	E.Tanaka	M.Muro	T.Masunaga
4	T22002	January 6, 2022	M.Muro	-	H.Ikari
3	T19121	October 1, 2019	S.Shigekoshi	M.Muro	H.Ikari
2	T15206	December 14, 2015	M.Muro	-	Y.Shimada
Rev.	ECN	Date	Prepared by	Checked by	Approved by

## 1. Purpose

To evaluate the performance of MINIFLEX 3-BFNH L Connector in accordance with PRS-1920.

## 2. Specimen

(1) Connector : MINIFLEX 3-BFNH L (P/N 20605-0\*\*E-02)

(2) FPC : Made by 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 2-1~2-5, Graph 1~14. For the details of the testing conditions and requirements, see PRS-1920.

The "n" in the tables show the number of measurement points.

## 5. Conclusion

All the specimens met the requirements of PRS-1920.

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 <sub>2</sub> S)											2					
Gas (SO <sub>2</sub> )												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)	51P	Initial	12.495N MAX. (0.245N/Pos. ×51P)	5	5	4.370 (0.086)	4.61 (0.09)	4.22 (0.08)	0.145 (0.003)	4.805 (0.094)	○
			20th cycles				3.818 (0.075)	3.99 (0.08)	3.60 (0.07)	0.157 (0.003)	4.289 (0.084)	○
		61P	Initial	14.945N MAX. (0.245N/Pos. ×61P)	5	5	5.212 (0.085)	5.33 (0.09)	5.03 (0.08)	0.135 (0.002)	5.617 (0.092)	○
			20th cycles				4.552 (0.075)	4.70 (0.08)	4.41 (0.07)	0.121 (0.002)	4.915 (0.081)	○
		71P	Initial	17.395N MAX. (0.245N/Pos. ×71P)	5	5	5.896 (0.083)	6.07 (0.09)	5.78 (0.08)	0.112 (0.002)	6.232 (0.088)	○
			20th cycles				5.166 (0.073)	5.22 (0.07)	5.11 (0.07)	0.050 (0.001)	5.316 (0.075)	○
	Act Un-locking Force (N)	51P	Initial	0.714N MIN. (0.014N/Pos. ×51P)	5	5	3.098 (0.061)	3.44 (0.07)	2.88 (0.06)	0.240 (0.005)	2.378 (0.047)	○
			20th cycles				2.698 (0.053)	2.91 (0.06)	2.46 (0.05)	0.170 (0.003)	2.188 (0.043)	○
		61P	Initial	0.854N MIN. (0.014N/Pos. ×61P)	5	5	3.528 (0.058)	3.71 (0.06)	3.32 (0.05)	0.163 (0.003)	3.039 (0.050)	○
			20th cycles				3.070 (0.050)	3.28 (0.05)	2.91 (0.05)	0.154 (0.003)	2.608 (0.043)	○
		71P	Initial	0.994N MIN. (0.014N/Pos. ×71P)	5	5	4.120 (0.058)	4.38 (0.06)	3.85 (0.05)	0.231 (0.003)	3.427 (0.048)	○
			20th cycles				3.590 (0.051)	3.75 (0.05)	3.47 (0.05)	0.119 (0.002)	3.233 (0.046)	○
B Group FPC Retention Force (N)	51P	Initial	6.63N MIN. (0.13N /Pos. ×51P)	5	5	20.974 (0.411)	21.76 (0.43)	20.13 (0.39)	0.597 (0.012)	19.183 (0.376)	○	
		After 20th	5.10N MIN. (0.10N /Pos. ×51P)			19.204 (0.377)	19.72 (0.39)	18.72 (0.37)	0.445 (0.009)	17.869 (0.350)	○	
	61P	Initial	7.93N MIN. (0.13N /Pos. ×61P)	5	5	25.188 (0.413)	25.88 (0.42)	24.32 (0.40)	0.634 (0.010)	23.286 (0.382)	○	
		After 20th	6.10N MIN. (0.10N /Pos. ×61P)			22.754 (0.373)	23.14 (0.38)	21.87 (0.36)	0.515 (0.008)	21.209 (0.348)	○	
	71P	Initial	9.23N MIN. (0.13N /Pos. ×71P)	5	5	29.140 (0.410)	29.50 (0.42)	28.55 (0.40)	0.400 (0.006)	27.940 (0.394)	○	
		After 20th	7.10N MIN. (0.10N /Pos. ×71P)			26.304 (0.370)	26.72 (0.38)	25.91 (0.36)	0.360 (0.005)	25.224 (0.355)	○	
C Group Retention Force (N)	Contact		0.3N MIN.	5	30	0.690	0.87	0.53	0.091	0.417	○	

※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				
D Group Vibration Shock	Contact Resistance (mΩ)	※T	Initial	60mΩ MAX.	5	305	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				-0.180	6.39	-6.48	3.357	9.891	○		
		※B	Initial	60mΩ MAX.			5	305	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						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					○							
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					○			

※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		
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					○
	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 <sup>5</sup> MΩ					○
			After Test				MIN. 2.0×10 <sup>4</sup> MΩ					○
		B	Initial		5	300	MIN. 5.0×10 <sup>5</sup> MΩ					○
			After Test				MIN. 1.0×10 <sup>4</sup> MΩ					○
Appearance		After Test	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		
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 <sup>5</sup> MΩ					○
			After Test				MIN. 5.0×10 <sup>4</sup> MΩ					○
B		Initial	5		300	MIN. 5.0×10 <sup>5</sup> MΩ					○	
		After Test				MIN. 3.0×10 <sup>4</sup> MΩ					○	
Appearance	After Test	No abnormality adversely affecting the performance shall occur.	10	10	No Abnormality					○		
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 <sub>2</sub> 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					○	

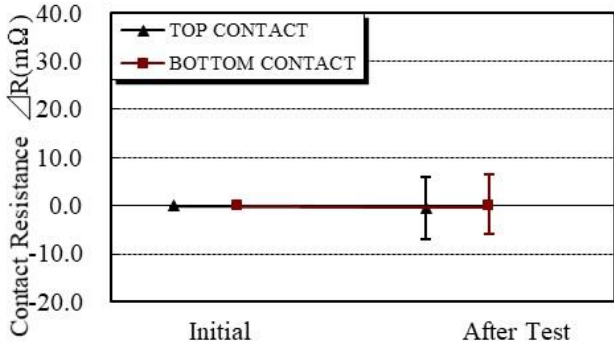
※T : Top Contact, B : Bottom Contact

Table 2-5 Test Result

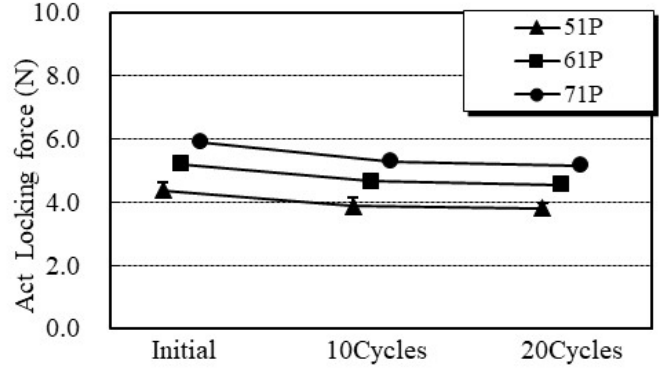
Test Item	Measurement		Spec.	Set	n	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
M Group Gas (SO <sub>2</sub> )	※T Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	305	27.181	36.02	17.85	4.768	41.485	○
		After Test	ΔR=40mΩ MAX.			0.037	7.75	-7.80	3.333	10.036	○
	※B Contact Resistance (mΩ)	Initial	60mΩ MAX.	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	T Contact Resistance (mΩ)	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 Contact Resistance (mΩ)	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					○	
P Group	Zerex Time (sec.)	Contact	3sec. MAX	5	5	MAX. 0.1sec.					○
Solderability	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					○

※T : Top Contact, B : Bottom Contact

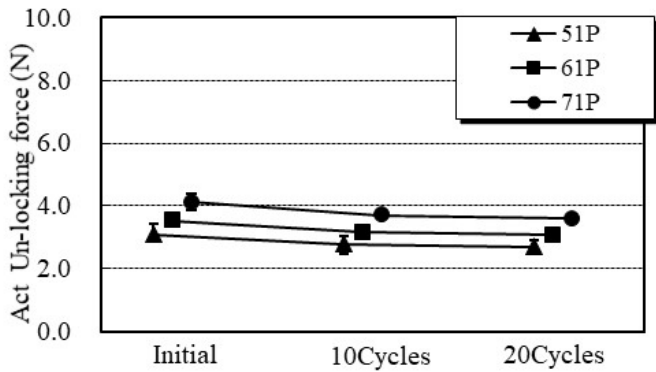




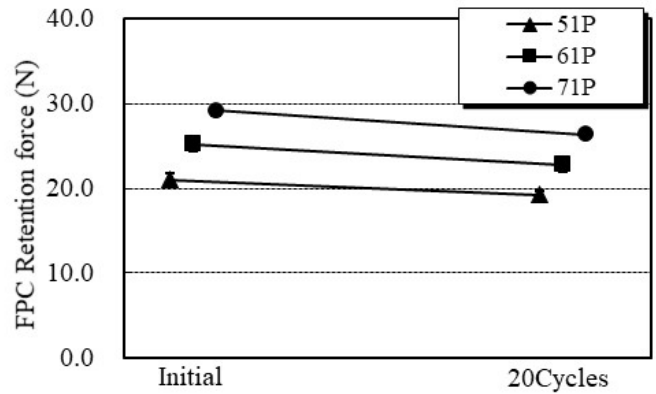
Graph.1 A change of contact resistance  
A group : Durability



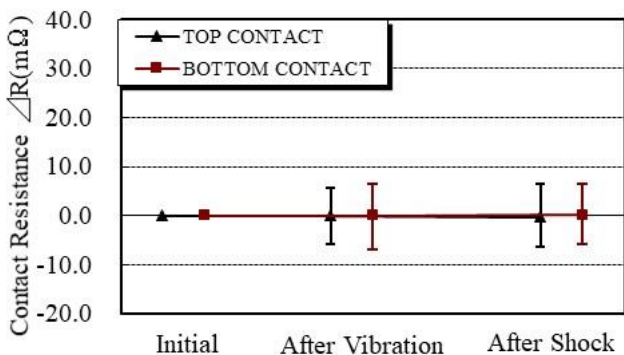
Graph.2 A change of Locking force  
A group : Durability



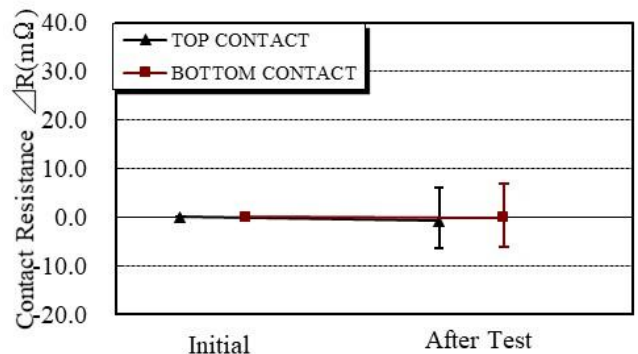
Graph.3 A change of Un-locking force  
A group : Durability



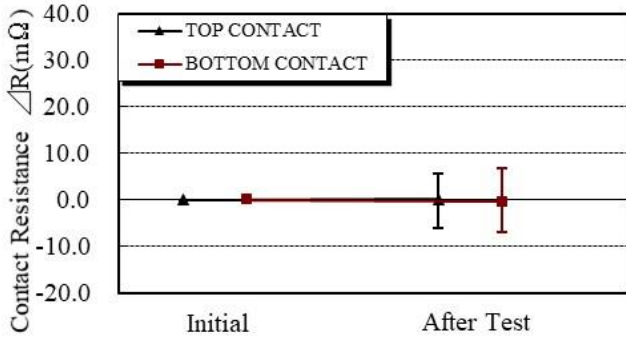
Graph.4 A change of FPC Retention force  
B group : FPC Retention force



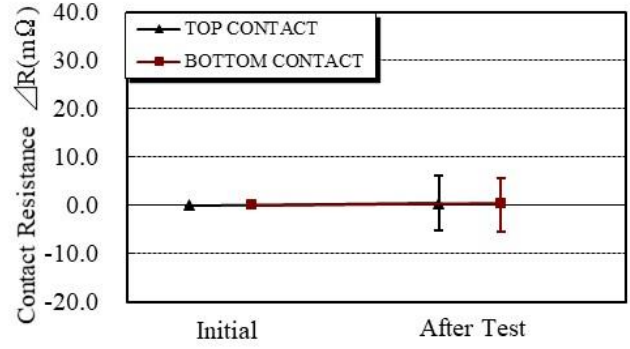
Graph.5 A change of contact resistance  
D group : Vibration / Shock



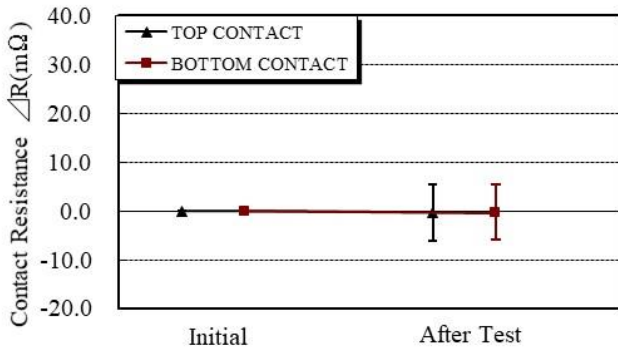
Graph.6 A change of contact resistance  
E group : Fretting Corrosion



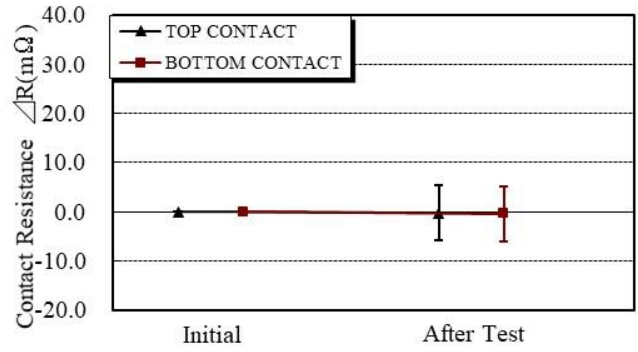
Graph.7 A change of contact resistance  
F group : Thermal Shock



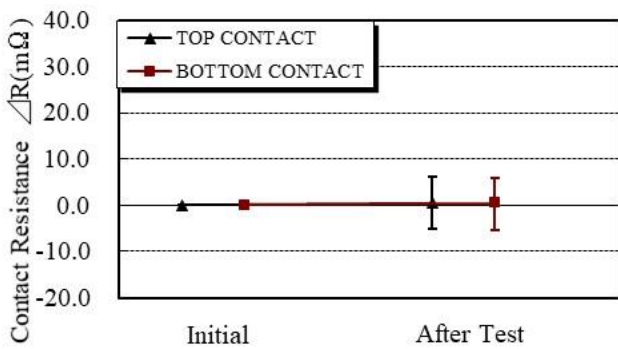
Graph.8 A change of contact resistance  
G group : High Temp. Life



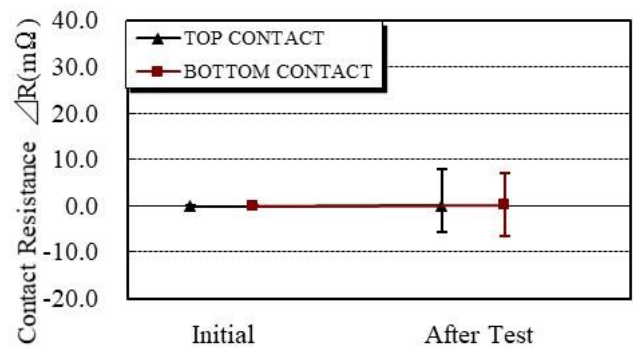
Graph.9 A change of contact resistance  
H group : High Temp. & High Hum. energizing



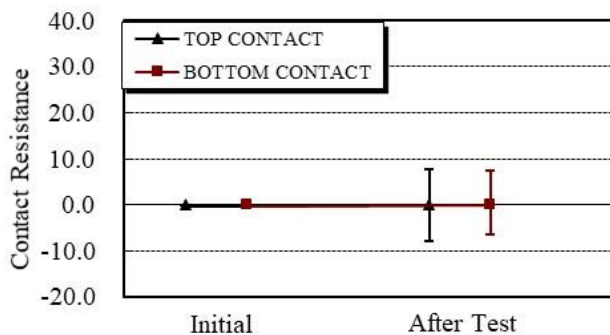
Graph.10 A change of contact resistance  
J group : High Temp. & High Hum. Life



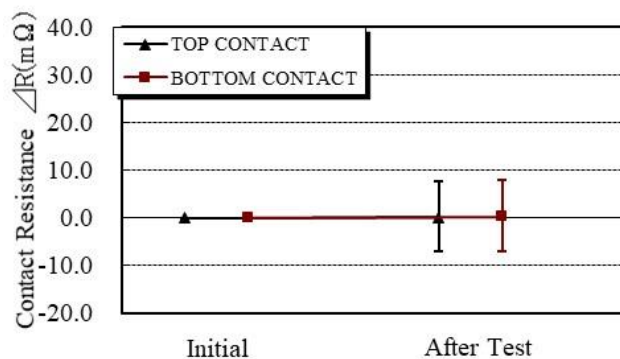
Graph.11 A change of contact resistance  
K group : Cold Temp. Life



Graph.12 A change of contact resistance  
L group : Gas( H<sub>2</sub>S )



Graph.13 A change of contact resistance  
M group : Gas( SO<sub>2</sub> )



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