

MINIFLEX® 5-BFN II LK (03)

Part No. 20600-0**E-01

Test Report

Product Specification no. PRS-1841

7	T21191	January 5, 2022	S.Shigekoshi	M.Muro	H.Ikari
6	T20045	July 13, 2020	M.Muro	-	Y.Shimada
5	T19149	November 7, 2019	M.Muro	-	H. Ikari
4	T19115	October 3, 2019	Y. Sasa	T. Masunaga	H. Ikari
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

To evaluate the performance of MINIFLEX 5-BFN II LK (03) Connector in accordance with PRS-1841.

2. Specimen

(1) MINIFLEX 5-BFN II LK (03) (Part No. 20600-0**E-01)

(2) FPC : Made by Taiyo Industrial Co.,Ltd.

Thickness Lead : $t=0.3\pm0.03$ (Actual measurement : 0.29~0.30mm)

3. Test Sequence

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

4. Result

See Table 2-1 to 2-5, Graph 1 to 17. For the details of the testing conditions and requirements, see PRS-1841.

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

5. Conclusion

All the specimens met the requirements of PRS-1841.

Table 1 Test Sequence and Sample Quantity

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. rise																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													
H/D Retention Force			2													
Vibration				2												
Shock				4												
Fretting corrosion					2											
Thermal Shock						2										
High Temp. Life							2									
High Temp & High Hum energizing								2								
High Temp & High Hum Life									2							
Cold Temp. Life										2						
Gas (H ₂ S)											2					
Gas (SO ₂)												2				
Salt Water Spray													2			
Solderability														1		
Soldering Heat Resist.															1	
Sample QTY.	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs

※ The number in "group" means the 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)	Initial	40mΩ MAX.	10	80	26.361	29.89	22.18	1.808	31.785	○
		20th cycles	ΔR=20mΩ MAX.			0.270	2.35	-2.50	1.491	4.743	○
	Act Locking Force (N)	4P Initial	3.6N MAX. (0.6N/Pos.×(4+2)P)	10	10	1.536	1.58	1.50	0.034	1.638	○
		4P 20th cycles				1.229	1.29	1.15	0.070	1.439	○
		6P Initial	4.8N MAX. (0.6N/Pos.×(6+2)P)	10	10	2.296	2.39	2.19	0.071	2.509	○
		6P 20th cycles				1.837	1.91	1.75	0.057	2.008	○
		8P Initial	6.0N MAX. (0.6N/Pos.×(8+2)P)	10	10	3.014	3.21	2.91	0.094	3.296	○
		8P 20th cycles				2.170	2.31	2.10	0.068	2.374	○
		10P Initial	7.2N MAX. (0.6N/Pos.×(10+2)P)	10	10	3.741	3.87	3.66	0.074	3.963	○
		10P 20th cycles				2.619	2.71	2.56	0.052	2.775	○
		12P Initial	8.4 N MAX. (0.6N/Pos.×(12+2)P)	10	10	4.518	4.60	4.42	0.068	4.722	○
		12P 20th cycles				3.253	3.31	3.18	0.049	3.400	○
		14P Initial	9.6 N MAX. (0.6N/Pos.×(14+2)P)	10	10	3.149	3.30	2.87	0.126	3.527	○
		14P 20th cycles				2.075	2.21	1.90	0.108	2.399	○
		16P Initial	10.8N MAX. (0.6N/Pos.×(16+2)P)	10	10	3.532	3.69	3.40	0.106	3.850	○
		16P 20th cycles				2.649	2.77	2.55	0.079	2.886	○
		18P Initial	12.0 N MAX. (0.6N/Pos.×(18+2)P)	10	10	4.017	4.11	3.91	0.065	4.212	○
		18P 20th cycles				2.942	3.00	2.84	0.061	3.125	○
		20P Initial	13.2 N MAX. (0.6N/Pos.×(20+2)P)	10	10	4.444	4.62	4.31	0.096	4.732	○
		20P 20th cycles				3.315	3.46	3.21	0.070	3.525	○
		22P Initial	14.4 N MAX. (0.6N/Pos.×(22+2)P)	10	10	4.878	5.07	4.72	0.104	5.190	○
		22P 20th cycles				3.625	3.76	3.50	0.072	3.841	○
		24P Initial	15.6N MAX. (0.6N/Pos.×(24+2)P)	10	10	5.233	5.38	5.12	0.079	5.470	○
		24P 20th cycles				3.925	4.04	3.84	0.059	4.102	○
		26P Initial	16.8 N MAX. (0.6N/Pos.×26+2)P)	10	10	5.755	5.94	5.63	0.083	6.004	○
		26P 20th cycles				4.319	4.46	4.17	0.081	4.562	○
		28P Initial	18.0 N MAX. (0.6N/Pos.×(28+2)P)	10	10	6.169	6.31	6.04	0.091	6.442	○
		28P 20th cycles				4.613	4.75	4.54	0.058	4.787	○

Table 2-2 Test Result

Test Item	Measurement		Spec.	Set	n	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
A Group Durability	Act Un-locking Force (N)	4P	Initial	10	10	0.977	1.02	0.93	0.039	0.860	○
			20th cycles			0.925	0.99	0.84	0.054	0.763	○
		6P	Initial	10	10	1.489	1.59	1.33	0.084	1.237	○
			20th cycles			1.415	1.51	1.26	0.080	1.175	○
		8P	Initial	10	10	2.020	2.18	1.89	0.105	1.705	○
			20th cycles			1.919	2.07	1.79	0.100	1.619	○
		10P	Initial	10	10	2.439	2.55	2.30	0.089	2.172	○
			20th cycles			2.317	2.42	2.18	0.085	2.062	○
		12P	Initial	10	10	2.960	3.09	2.84	0.097	2.669	○
			20th cycles			2.812	2.93	2.69	0.092	2.536	○
		14P	Initial	10	10	2.089	2.22	1.94	0.081	1.846	○
			20th cycles			1.900	2.14	1.75	0.114	1.558	○
		16P	Initial	10	10	2.337	2.45	2.21	0.098	2.043	○
			20th cycles			2.157	2.26	2.04	0.090	1.887	○
		18P	Initial	10	10	2.596	2.73	2.52	0.062	2.410	○
			20th cycles			2.406	2.55	2.27	0.099	2.109	○
		20P	Initial	10	10	2.891	3.12	2.66	0.126	2.513	○
			20th cycles			2.689	2.94	2.54	0.128	2.305	○
		22P	Initial	10	10	3.200	3.35	3.00	0.123	2.831	○
			20th cycles			2.981	3.07	2.75	0.095	2.696	○
		24P	Initial	10	10	3.679	3.75	3.57	0.062	3.493	○
			20th cycles			3.396	3.46	3.29	0.057	3.225	○
		26P	Initial	10	10	3.826	3.93	3.68	0.075	3.601	○
			20th cycles			3.497	3.69	3.30	0.125	3.122	○
		28P	Initial	10	10	4.051	4.13	3.97	0.051	3.898	○
			20th cycles			3.768	3.84	3.67	0.066	3.570	○

Table 2-3 Test Result

Test Item	Measurement		Spec.	Set	n	データ					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
B Group FPC Retention Force(N)	4P	Initial	2.6 N MIN (0.15N/Pos.× 4P+2.0N)	10	10	9.373	9.57	9.18	0.195	8.788	○
		20th cycles	1.6 N MIN (0.15N/Pos.× 4P+1.0N)			8.441	8.72	8.24	0.252	7.685	○
	6P	Initial	2.9 N MIN (0.15N/Pos.× 6P+2.0N)	10	10	10.592	10.71	10.46	0.081	10.349	○
		20th cycles	1.9 N MIN (0.15N/Pos.× 6P+1.0N)			9.476	9.58	9.36	0.073	9.257	○
	8P	Initial	3.2 N MIN (0.15N/Pos.× 8P+2.0N)	10	10	11.837	12.20	11.62	0.186	11.279	○
		20th cycles	2.2 N MIN (0.15N/Pos.× 8P+1.0N)			10.590	10.69	10.40	0.090	10.320	○
	10P	Initial	3.5 N MIN (0.15N/Pos.× 10P+2.0N)	10	10	13.249	13.45	13.05	0.139	12.832	○
		20th cycles	2.5 N MIN (0.15N/Pos.× 10P+1.0N)			11.853	12.03	11.68	0.124	11.481	○
	12P	Initial	3.8 N MIN (0.15N/Pos.× 12P+2.0N)	10	10	14.581	14.71	14.44	0.098	14.287	○
		20th cycles	2.8 N MIN (0.15N/Pos.× 12P+1.0N)			13.045	13.16	12.92	0.088	12.781	○
	14P	Initial	4.1 N MIN (0.15N/Pos.× 14P+2.0N)	10	10	13.621	13.72	13.53	0.069	13.414	○
		20th cycles	3.1 N MIN (0.15N/Pos.× 14P+1.0N)			11.827	11.92	11.72	0.061	11.644	○
	16P	Initial	4.4 N MIN (0.15N/Pos.× 16P+2.0N)	10	10	14.503	14.58	14.36	0.089	14.236	○
		20th cycles	3.4 N MIN (0.15N/Pos.× 16P+1.0N)			12.585	12.69	12.42	0.109	12.258	○
	18P	Initial	4.7 N MIN (0.15N/Pos.× 18P+2.0N)	10	10	15.431	15.54	15.30	0.073	15.212	○
		20th cycles	3.7 N MIN (0.15N/Pos.× 18P+1.0N)			13.341	13.54	13.22	0.092	13.065	○
	20P	Initial	5.0 N MIN (0.15N/Pos.× 20P+2.0N)	10	10	16.315	16.43	16.18	0.073	16.096	○
		20th cycles	4.0 N MIN (0.15N/Pos.× 20P+1.0N)			14.137	14.27	14.03	0.065	13.942	○
	22P	Initial	5.3 N MIN (0.15N/Pos.× 22P+2.0N)	10	10	17.201	17.31	17.08	0.069	16.994	○
		20th cycles	4.3 N MIN (0.15N/Pos.× 22P+1.0N)			14.903	14.99	14.80	0.067	14.702	○
	24P	Initial	5.6 N MIN (0.15N/Pos.× 24P+2.0N)	10	10	18.084	18.17	18.01	0.059	17.907	○
		20th cycles	4.6 N MIN (0.15N/Pos.× 24P+1.0N)			15.692	15.77	15.63	0.051	15.539	○
	26P	Initial	5.9 N MIN (0.15N/Pos.× 26P+2.0N)	10	10	18.977	19.06	18.92	0.048	18.833	○
		20th cycles	4.9 N MIN (0.15N/Pos.× 26P+1.0N)			16.479	16.57	16.33	0.076	16.251	○
	28P	Initial	6.2 N MIN (0.15N/Pos.× 28P+2.0N)	10	10	19.838	19.95	19.74	0.072	19.622	○
		20th cycles	5.2 N MIN (0.15N/Pos.× 28P+1.0N)			17.251	17.40	17.09	0.081	17.008	○

Table 2-4 Test Result

Test Item	Measurement		Spec.	Set	n	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
C Group Retention Force	C/T		0.5 N MIN	10	20	1.289	1.37	1.20	0.052	1.133	○
	Lock		0.5 N MIN	10	20	1.302	1.39	1.23	0.089	1.035	○
	H/D		0.5 N MIN	10	20	0.867	0.97	0.80	0.050	0.717	○
D Group Vibration Shock	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.738	29.98	22.12	1.801	32.141	○
		After Vibration	ΔR=20mΩ MAX.			-1.396	0.44	-2.34	0.624	0.476	○
		After Shock				-0.715	1.70	-2.14	0.824	1.757	○
	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)	Initial	40mΩ MAX.	10	80	26.426	29.80	21.63	1.926	32.204	○
		After Test	ΔR=20mΩ MAX.			-1.758	1.19	-3.49	1.083	1.491	○
	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)	Initial	40mΩ MAX.	10	80	26.681	30.21	21.92	1.736	31.889	○
		After Test	ΔR=20mΩ MAX.			-1.794	2.69	-6.80	1.926	3.984	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○
G Group High Temp. Life	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.144	29.29	21.81	1.809	31.571	○
		After Test	ΔR=20mΩ MAX.			1.463	6.47	-2.64	2.262	8.249	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○
H Group High Temp. & High Hum. Energizing	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.348	29.77	21.69	1.905	32.063	○
		After Test	ΔR=20mΩ MAX.			1.511	5.56	-1.32	2.015	7.556	○
	D.W.Voltage	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur	10	40	No Abnormality					○
		After Test				No Abnormality					○
	Insulation Resistance (MΩ)	In Vibration	100MΩ MIN	10	40	MIN. 2.0×10 ⁴ MΩ					○
		In Shock				MIN. 3.0×10 ³ MΩ					○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○

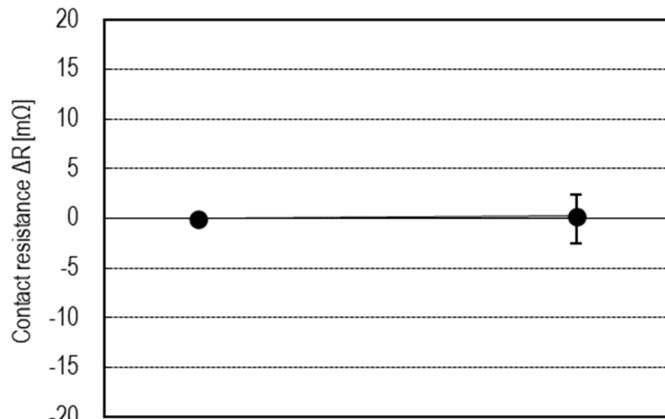
(※1.) Only the F (thermal shock) and G Group (high temperature life) results were obtained using FPC made by NIPPON MECTRON, Ltd., while the results for the other groups were obtained using FPC made by Made by Taiyo Industrial Co.,Ltd..

Table 2-5 Test Result

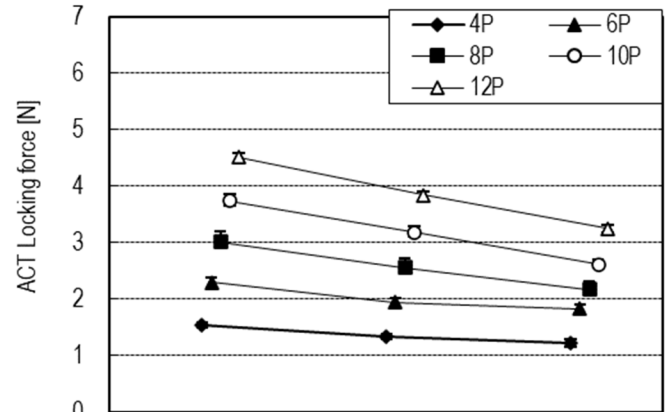
Test Item	Measurement		Spec.	Set	n	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
J Group High Temp. & High Hum. Life	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.765	29.75	22.16	1.820	32.225	○
		After Test	ΔR=20mΩ MAX.			2.052	5.76	-2.40	2.447	9.393	○
	D.W.Voltage	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur	10	40	No Abnormality					○
		After Test				No Abnormality					○
	Insulation Resistance (MΩ)	In Vibration	100MΩ MIN	10	40	MIN. 2.0×10 ⁴ MΩ					○
		In Shock				MIN. 3.0×10 ³ MΩ					○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○
	K Group Cold Temp. Life	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.483	29.80	22.04	1.943	32.312
After Test			ΔR=20mΩ MAX.	0.062			2.83	-2.28	1.530	4.652	○
Appearance		After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○
L Group Gas(H2S)	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.381	29.61	21.83	1.851	31.934	○
		After Test	ΔR=20mΩ MAX.			0.157	3.90	-2.04	1.564	4.849	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○
M Group Gas(SO2)	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.522	30.24	21.52	1.892	32.198	○
		After Test	ΔR=20mΩ MAX.			0.419	3.60	-2.33	1.849	5.966	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○
N Group Salt Water Spray	Contact Resistance (mΩ)	Initial	40mΩ MAX.	10	80	26.288	29.35	21.26	1.886	31.946	○
		After Test	ΔR=20mΩ MAX.			1.268	4.94	-1.76	1.685	6.323	○
	Appearance	After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○
P Group Solderability	Zerox Time (sec.)	C/T	3sec. MAX	10	10	MAX. 0.1sec.					○
		H/D				MAX. 0.2sec.					○
	Appearance	C/T	Wetness 95% MIN.	10	10	95%MIN.was wet.					○
		H/D				95%MIN.was wet.					○
Q Group Soldering Heat Resistance	Reflow twice		No Abnormality	10	10	No Abnormality					○
	Soldering iron										○
R Group Temp. rising	0.5A/Contact 7.0A/Connector		ΔT=30℃ MAX.	10	10	MAX. 26.2℃					○

* To evaluate about Temp. Rising Test with FPC made by Taiyo Industrial Co.,Ltd (Thickness Lead : t=0.3mm, Length : L=70mm).

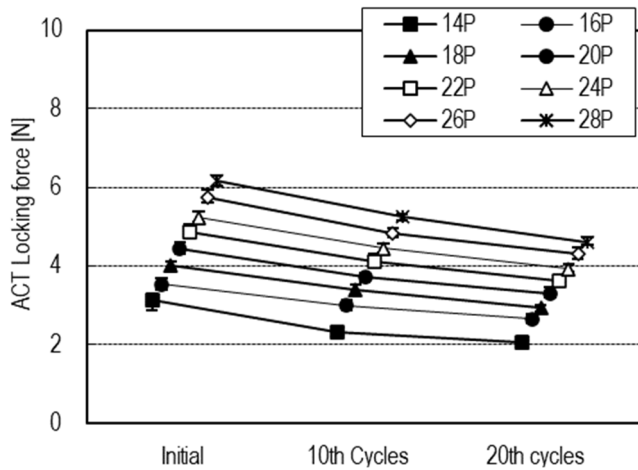
It is a result of when applied ratings current (0.5A/Contact) between the neighboring contacts for 14pos. (With the whole connector 7.0A).



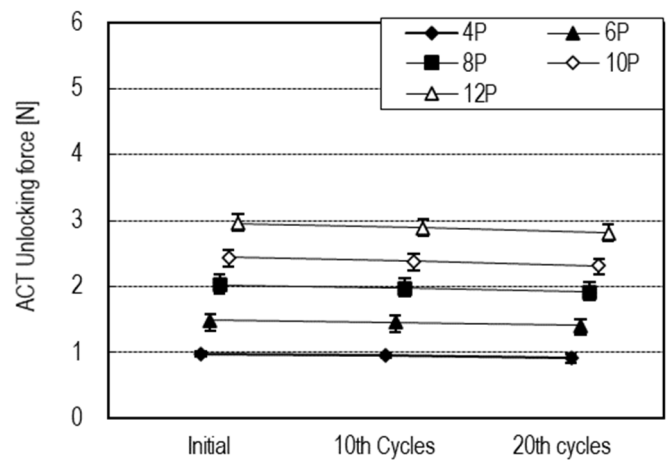
Graph 1. A change of Contact Resistance
A group : Durability



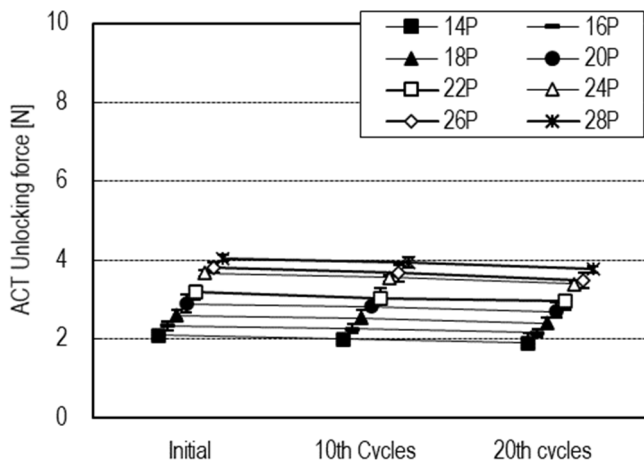
Graph 2. A change of Locking Force (4P~12P)
A group : Durability



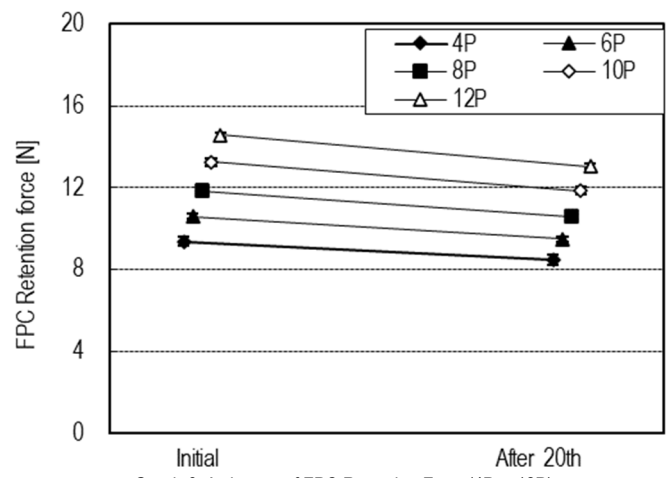
Graph 3. A change of Locking Force (14P~28P)
A group : Durability



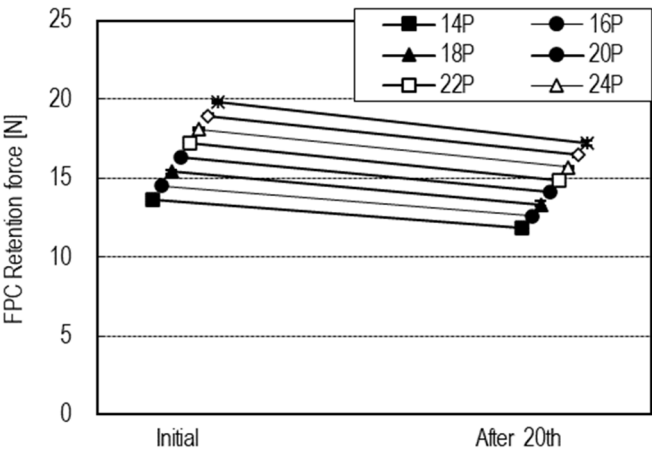
Graph 4. A change of Un-locking Force (4P~12P)
A group : Durability



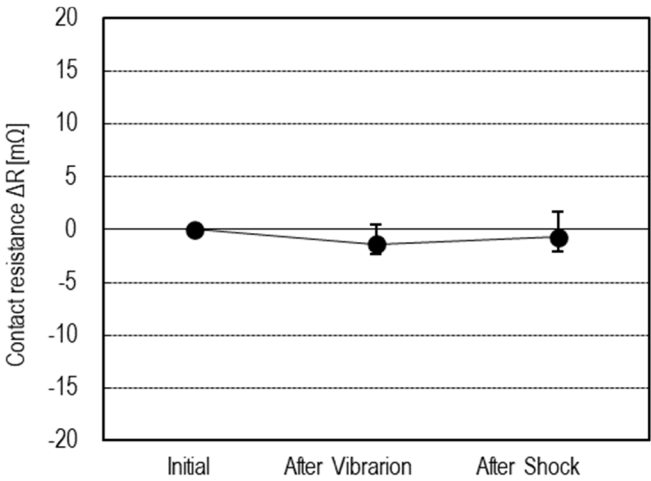
Graph 5. A change of Un-locking Force (14P~28P)
A group : Durability



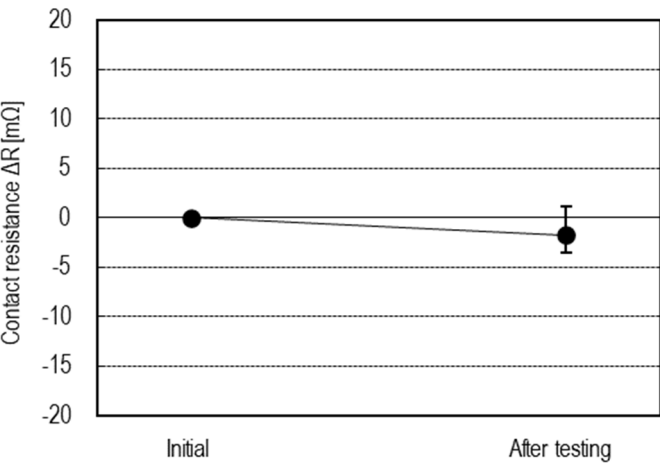
Graph 6. A change of FPC Retention Force(4P~12P)
B group : FPC Retention Force



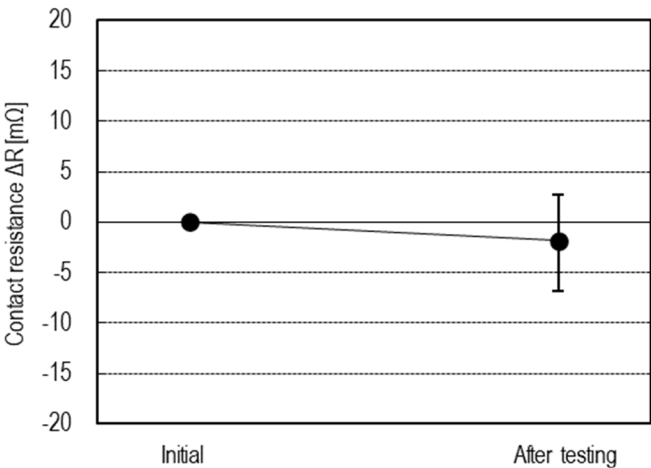
Graph 7. A change of FPC Retention Force(14P~28P)
B group : FPC Retention Force



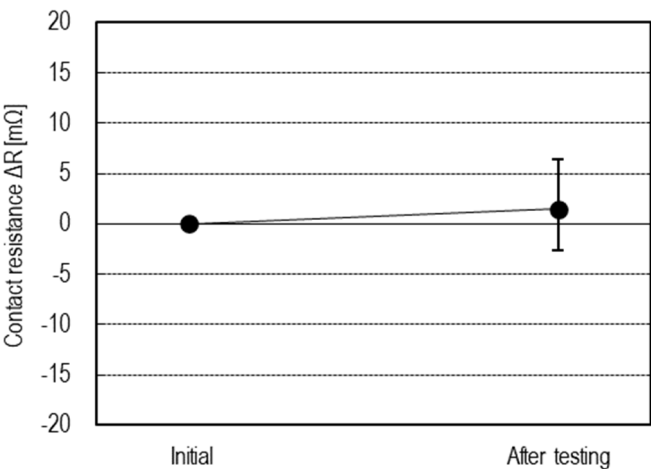
Graph 8. A change of Contact Resistance
D group : Vibration / Shock



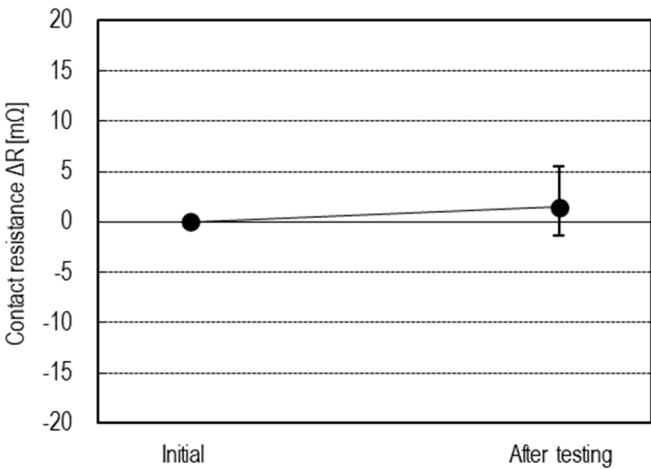
Graph 9. A change of Contact Resistance
E group : Fretting Corrosion



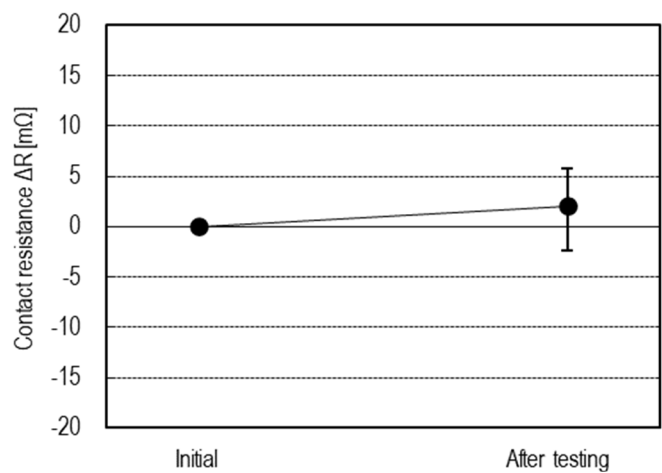
Graph 10. A change of Contact Resistance
F group : Thermal Shock



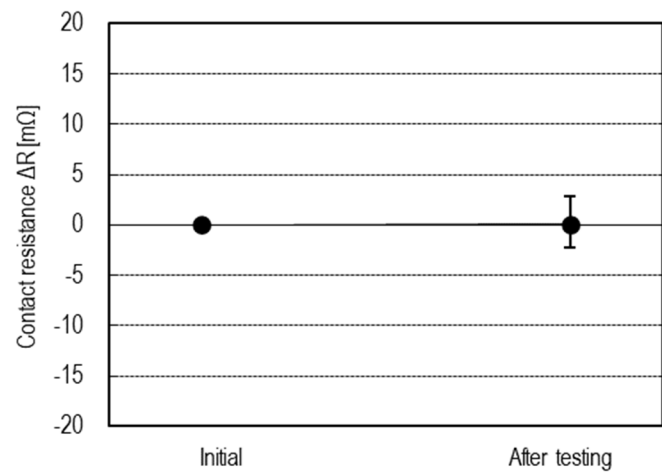
Graph 11. A change of Contact Resistance
G group : High Temp. Life



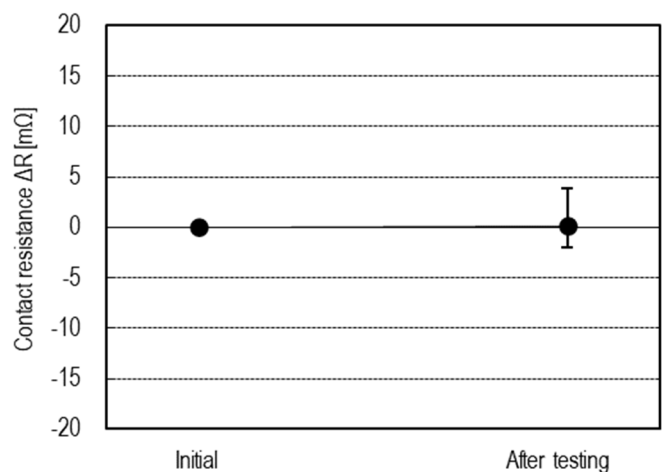
Graph 12. A change of Contact Resistance
H group : High Temp. & High Hum. Energizing



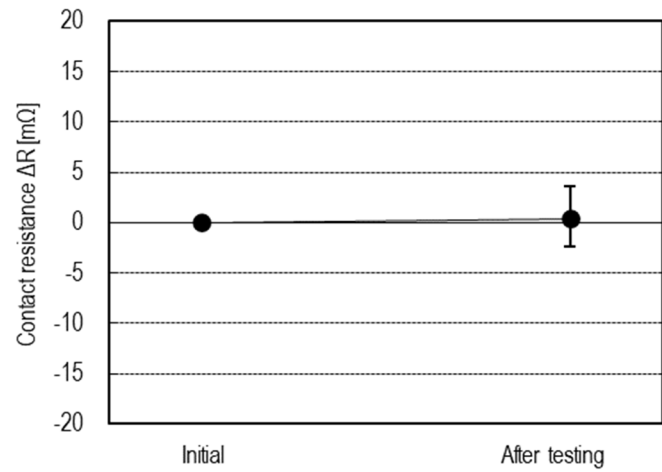
Graph 13. A change of Contact Resistance
J group : High Temp. & High Hum. Life



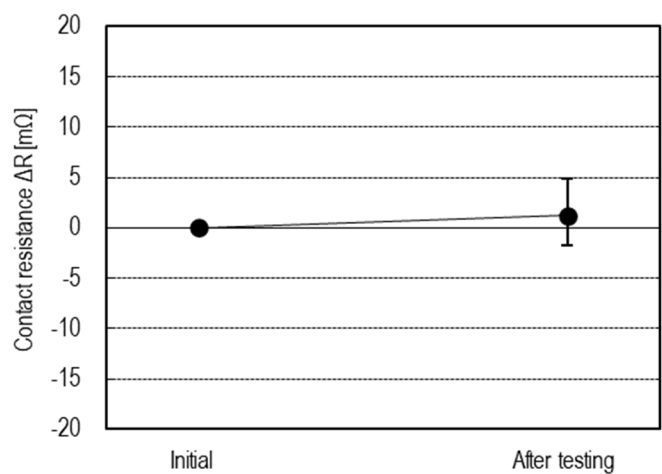
Graph 14. A change of Contact Resistance
K group : Cold Temp. Life



Graph 15. A change of Contact Resistance
L group : Gas (H2S)



Graph 16. A change of Contact Resistance
M group : Gas (SO2)



Graph 17. A change of Contact Resistance
N group : Salt Water Spray