

MINIFLEX® 2-BF

Part No. 20617-***E-01

Test Report

Product Specification no. PRS-2319

2	T22031	February 3, 2022	S.Shigekoshi	M.Muro	H.Ikari
1	T19126	October 1, 2019	S.Shigekoshi	M.Muro	H.Ikari
0	T16188	December 1, 2016	Y.Sasa	H.Ikari	Y.Shimada
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

To evaluate the performance of MINIFLEX 2-BFConnector in accordance with PRS-2319.

2. Specimen

- (1) MINIFLEX 2-BF (Part No. 20617-***E-01)
- (2) FPC : Made by Taiyo Industrial Co., Ltd
FPC thickness : $t=0.20\pm0.03$ (Actual measurement : 0.198~0.202)

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 14. For the details of the testing conditions and requirements, see PRS-2319.
The “n” in the tables show the number of measurement points.

5. Conclusion

All the specimens met the requirements of PRS-2319.

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	2,6			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	3,7															
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	100mΩ MAX.	5	500	48.833	60.61	37.28	6.115	67.178	○	
			After 20th	ΔR=40mΩ MAX.			-0.302	3.12	-5.36	1.764	4.990	○	
		※B	Initial	100mΩ MAX.	5	500	42.483	58.61	30.11	7.758	65.757	○	
			After 20th	ΔR=40mΩ MAX.			0.795	3.60	-1.95	0.954	3.657	○	
	Act Locking Force (N)	80P	Initial	16.00N MAX. (0.20N/Pos.×80P)	5	5	8.618 (0.108)	8.84 (0.11)	8.19 (0.10)	0.301 (0.004)	9.521 (0.119)	○	
			20th cycles				7.180 (0.090)	7.31 (0.09)	7.00 (0.09)	0.132 (0.002)	7.576 (0.095)	○	
		100P	Initial	20.00N MAX. (0.20N/Pos.×100P)	5	5	10.772 (0.108)	11.05 (0.11)	10.24 (0.10)	0.376 (0.004)	11.900 (0.119)	○	
			20th cycles				8.696 (0.087)	9.22 (0.09)	8.17 (0.08)	0.427 (0.004)	9.977 (0.100)	○	
		120P	Initial	24.00N MAX. (0.20N/Pos.×120P)	5	5	12.554 (0.105)	12.92 (0.11)	12.18 (0.10)	0.370 (0.003)	13.664 (0.114)	○	
			20th cycles				10.770 (0.090)	10.96 (0.09)	10.50 (0.09)	0.198 (0.002)	11.364 (0.095)	○	
	Act Un-locking Force (N)	80P	Initial	1.12N MIN. (0.014N/Pos.×80P)	5	5	3.758 (0.047)	3.84 (0.05)	3.63 (0.05)	0.092 (0.001)	3.482 (0.044)	○	
			20th cycles				3.235 (0.040)	3.44 (0.04)	3.10 (0.04)	0.150 (0.002)	2.785 (0.035)	○	
		100P	Initial	1.40N MIN. (0.014N/Pos.×100P)	5	5	4.698 (0.047)	4.80 (0.05)	4.54 (0.05)	0.115 (0.001)	4.353 (0.044)	○	
			20th cycles				4.094 (0.041)	4.36 (0.04)	3.92 (0.04)	0.190 (0.002)	3.524 (0.035)	○	
		120P	Initial	1.68N MIN. (0.014N/Pos.×120P)	5	5	5.060 (0.042)	5.18 (0.04)	4.96 (0.04)	0.090 (0.001)	4.790 (0.040)	○	
			20th cycles				4.425 (0.037)	4.57 (0.04)	4.20 (0.04)	0.163 (0.001)	3.936 (0.033)	○	
B Group FPC Retention Force(N)			80P	Initial	16.0N MIN. (0.20N/Pos.×80P)	5	5	24.406 (0.305)	25.65 (0.32)	23.68 (0.30)	0.886 (0.011)	21.748 (0.272)	○
				20th cycles	16.0N MIN. (0.20N/Pos.×80P)			23.686 (0.296)	24.15 (0.30)	23.34 (0.29)	0.342 (0.004)	22.660 (0.283)	○
			100P	Initial	20.0N MIN. (0.20N/Pos.×100P)	5	5	31.360 (0.314)	32.22 (0.32)	30.18 (0.30)	0.865 (0.009)	28.765 (0.288)	○
				20th cycles	20.0N MIN. (0.20N/Pos.×100P)			30.444 (0.304)	31.13 (0.31)	29.51 (0.30)	0.683 (0.007)	28.395 (0.284)	○
			120P	Initial	24.0N MIN. (0.20N/Pos.×120P)	5	5	37.064 (0.309)	37.98 (0.32)	35.37 (0.29)	1.197 (0.010)	33.473 (0.279)	○
				20th cycles	24.0N MIN. (0.20N/Pos.×120P)			36.360 (0.303)	37.54 (0.31)	34.63 (0.29)	1.250 (0.010)	32.610 (0.272)	○

※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	
C Group	Contact-A			0.1N MIN.	5	20	0.193	0.23	0.17	0.019	0.136	○
C/T Retention Force(N)	Contact-B				5	20	0.275	0.31	0.23	0.023	0.206	○
D Group Vibration Shock	Contact Resistance (mΩ)	※T	Initial	100mΩ MAX.	5	500	47.708	54.37	42.07	2.593	55.487	○
			After Vibration	ΔR=40mΩ MAX.			-0.777	2.24	-4.72	1.332	3.219	○
			After Shock				-1.962	2.14	-5.67	1.393	2.217	○
		※B	Initial	100mΩ MAX.	5	500	41.576	53.59	31.34	6.220	60.236	○
			After Vibration	ΔR=40mΩ MAX.			0.719	5.07	-3.62	1.502	5.225	○
			After Shock				-0.446	2.74	-3.71	1.162	3.040	○
	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	100mΩ MAX.	5	500	47.373	55.26	43.11	2.801	55.776	○
			After Test	ΔR=40mΩ MAX.			-1.975	0.68	-4.89	0.990	0.995	○
		B	Initial	100mΩ MAX.	5	500	42.128	54.93	29.87	6.775	62.453	○
			After Test	ΔR=40mΩ MAX.			-2.311	0.16	-4.88	0.868	0.293	○
	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	100mΩ MAX.	5	500	49.343	58.84	41.12	3.473	59.762	○
			After Test	ΔR=40mΩ MAX.			-5.071	0.39	-9.99	2.238	1.643	○
		B	Initial	100mΩ MAX.	5	500	43.480	53.91	34.44	5.176	59.008	○
			After Test	ΔR=40mΩ MAX.			-2.102	2.86	-6.19	1.760	3.178	○
	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	100mΩ MAX.	5	500	46.934	55.17	40.43	2.880	55.574	○	
			After Test	ΔR=40mΩ MAX.			-3.936	3.35	-9.67	2.465	3.459	○	
		※B	Initial	100mΩ MAX.	5	500	42.196	53.81	32.74	5.363	58.285	○	
			After Test	ΔR=40mΩ MAX.			-1.146	3.53	-4.82	1.652	3.810	○	
	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)	T	Initial	100mΩ MAX.	5	500	48.140	54.92	39.62	3.002	57.146	○	
			After Test	ΔR=40mΩ MAX.			-0.770	8.95	-10.84	3.383	9.379	○	
		B	Initial	100mΩ MAX.	5	500	41.685	53.41	30.63	6.501	61.188	○	
			After Test	ΔR=40mΩ MAX.			0.170	3.66	-3.13	1.183	3.719	○	
	D.W.Voltage	T	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur	5	250	No Abnormality					○	
			After Test				No Abnormality					○	
		B	Initial		5	250	No Abnormality					○	
			After Test				No Abnormality					○	
	Insulation Resistance (MΩ)	T	Initial		100M Ω MIN	5	250	MIN. 3.3×10 ⁴ MΩ					○
			After Test					MIN. 5.6×10 ³ MΩ					○
		B	Initial			5	250	MIN. 8.7×10 ³ MΩ					○
			After Test					MIN. 3.7×10 ³ 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

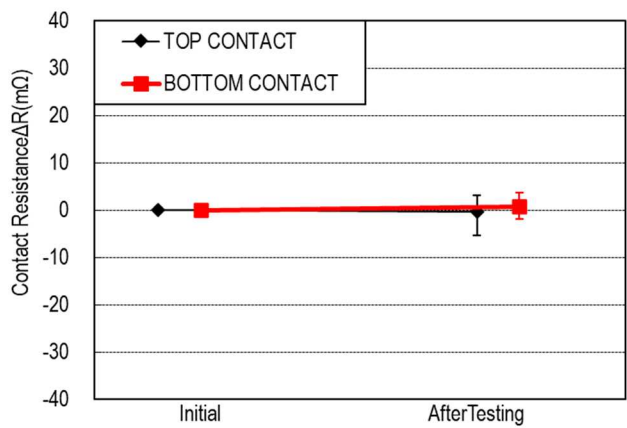
Test Item	Measurement			Spec.	Set	N	Data					Judge	
							AVE.(X)	MAX.	MIN.	S	X±3s		
J Group High Temp. & High Hum. Life	Contact Resistance (mΩ)	※T	Initial	100mΩ MAX.	5	500	48.658	55.88	40.70	2.660	56.638	○	
			After Test	ΔR=40mΩ MAX.			-3.986	1.20	-9.07	1.999	2.011	○	
		※B	Initial	100mΩ MAX.	5	500	41.210	54.83	29.96	6.772	61.526	○	
			After Test	ΔR=40mΩ MAX.			-2.606	1.46	-6.20	1.470	1.804	○	
		D.W.Voltag	T	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur	5	250	No Abnormality					○
				After Test				No Abnormality					○
	B		Initial	5		250	No Abnormality					○	
			After Test				No Abnormality					○	
	Insulation Resistance (MΩ)	T	Initial	100MΩ MIN	5	250	MIN. 2.4×10³MΩ					○	
			After Test				MIN. 2.1×10³MΩ					○	
		B	Initial		5	250	MIN. 1.3×10³MΩ					○	
			After Test				MIN. 1.3×10³MΩ					○	
	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	100mΩ MAX.	5	500	47.938	57.82	40.34	3.406	58.156	○
				After Test	ΔR=40mΩ MAX.			-0.420	2.29	-3.87	1.258	3.354	○
			B	Initial	100mΩ MAX.	5	500	42.999	52.69	33.14	4.718	57.153	○
After Test				ΔR=40mΩ MAX.	-0.553			1.90	-3.01	0.859	2.024	○	
Appearance		After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○		
L Group Gas(H₂S)	Contact Resistance (mΩ)	T	Initial	100mΩ MAX.	5	500	47.579	51.70	43.38	1.640	52.499	○	
			After Test	ΔR=40mΩ MAX.			-2.010	1.05	-7.43	1.812	3.426	○	
		B	Initial	100mΩ MAX.	5	500	43.972	53.46	35.16	5.269	59.779	○	
			After Test	ΔR=40mΩ MAX.			0.758	4.01	-2.80	1.189	4.325	○	
	Appearance		After Test	No abnormality adversely affecting the performance shall occur	10	10	No Abnormality					○	

※T : Top Contact B : Bottom Contact

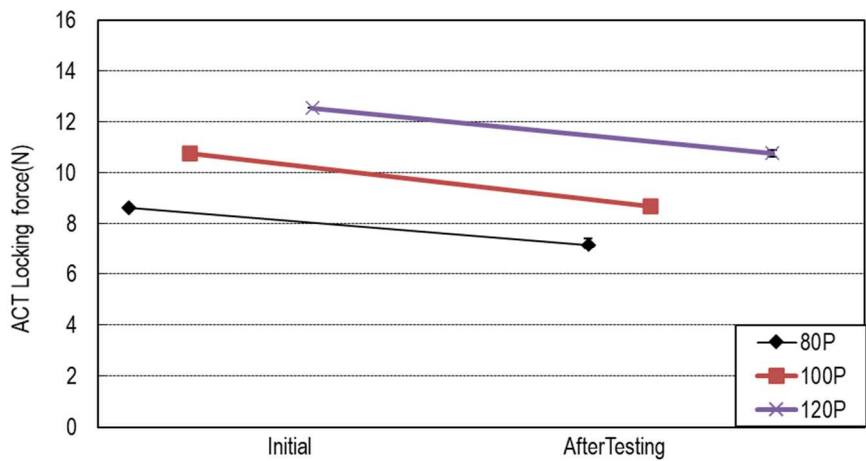
Table.2-5 Test result

Test Item	Measurement			Spec.	Set	N	Data					Judge
							AVE.(X)	MAX.	MIN.	S	X±3s	
M Group Gas(SO ₂)	Contact Resistance (mΩ)	※T	Initial	100mΩ MAX.	5	500	47.096	52.97	42.90	1.999	53.093	○
			After Test	ΔR=40mΩ MAX.			-2.053	1.01	-5.35	1.118	1.301	○
		※B	Initial	100mΩ MAX.	5	500	43.598	54.65	31.62	5.850	61.148	○
			After Test	ΔR=40mΩ MAX.			-1.564	2.89	-5.52	1.508	2.960	○
	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	100mΩ MAX.	5	500	49.043	56.15	42.35	3.207	58.664	○
			After Test	ΔR=40mΩ MAX.			0.701	5.34	-4.23	1.808	6.125	○
		B	Initial	100mΩ MAX.	5	500	43.064	58.81	27.86	8.630	68.954	○
			After Test	ΔR=40mΩ MAX.			0.522	3.76	-2.45	1.134	3.924	○
	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	5	5	MAX. 0.1sec.					○	
	Appearance	C/T	Wetness: 95% MIN.	5	5	95%MIN.was wet.					○	
Q Group Soldering Heat Resistance	Reflow twice			No Abnormality	5	5	No Abnormality					○
	Soldering iron											
R Group Temp. rising	0.2A/Contact			ΔT=30K MAX.	5	5	MAX.ΔT=28.2K No Problem					○

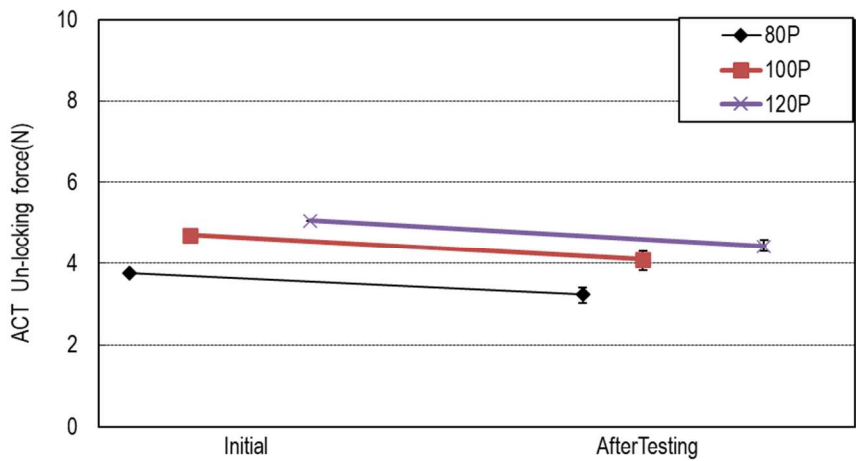
※T : Top Contact B : Bottom Contact)



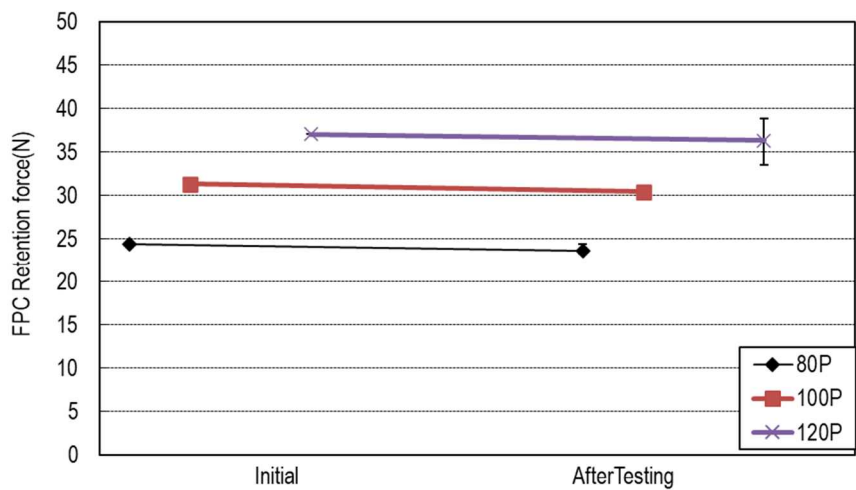
Graph.1 A change of contact resistance / A group : Durability



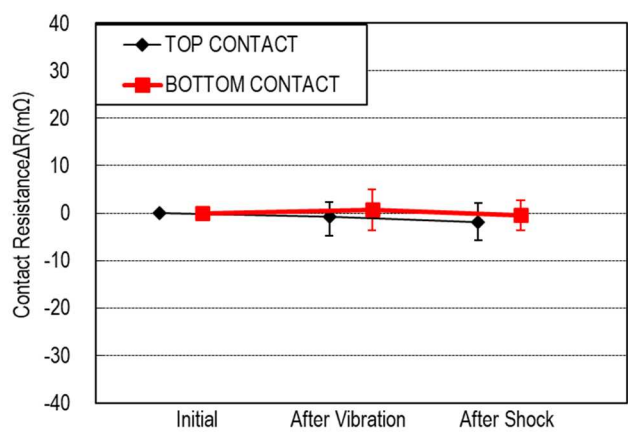
Graph.2 A change of Locking force / A group : Durability



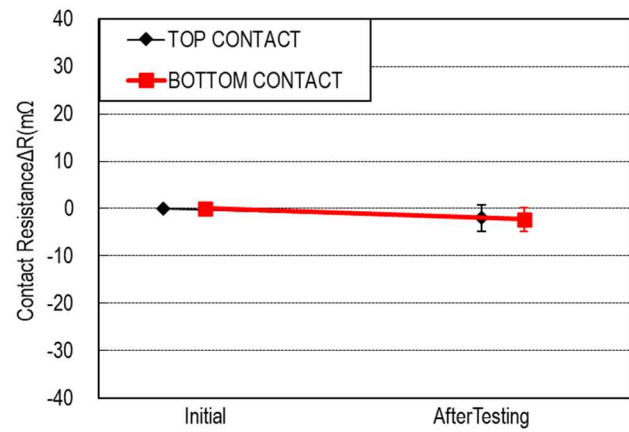
Graph.3 A change of Un-Locking force / A group : Durability



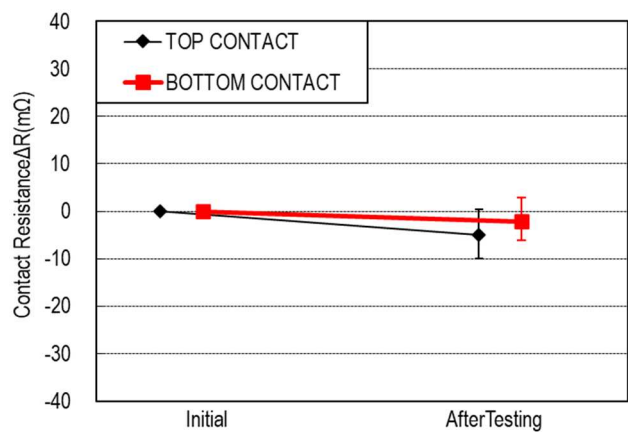
Graph.4 A change of FPC Retention force / B group : FPC Retention force



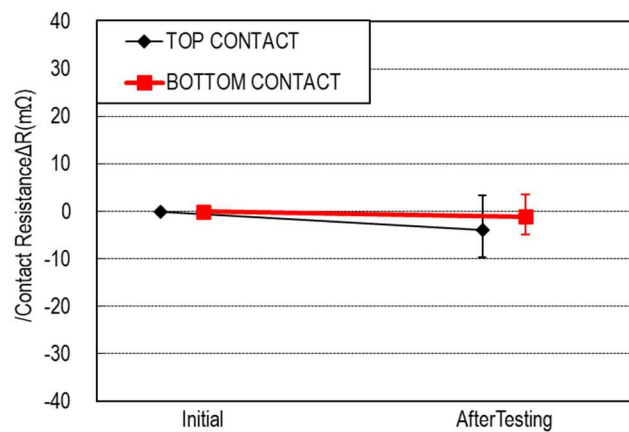
Graph.5 A change of contact resistance / D group : Vibration/Shock



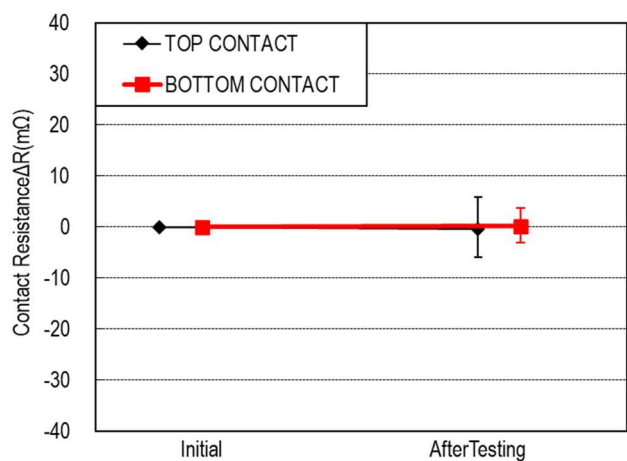
Graph.6 A change of contact resistance / E group : Fretting Corrosion



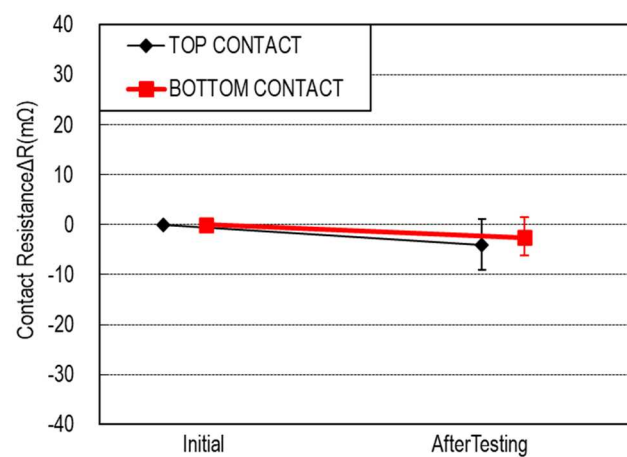
Graph.7 A change of contact resistance / F group : Thermal Shock



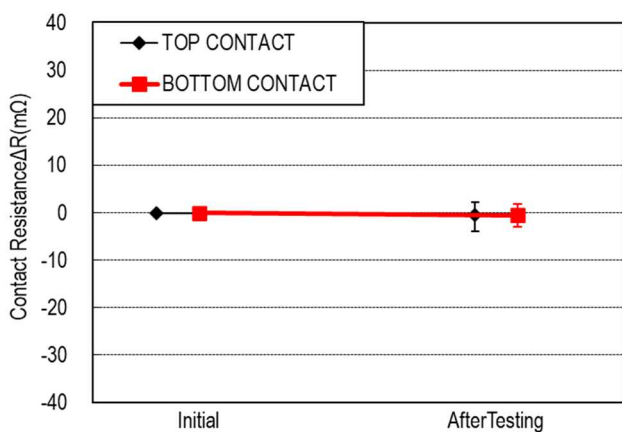
Graph.8 A change of contact resistance / G group : High Temp. Life



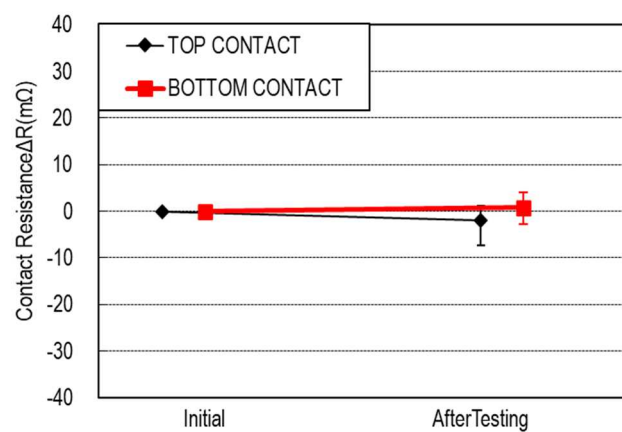
Graph.9 A change of contact resistance
/ H group : High Temp. & High Hum. energizing



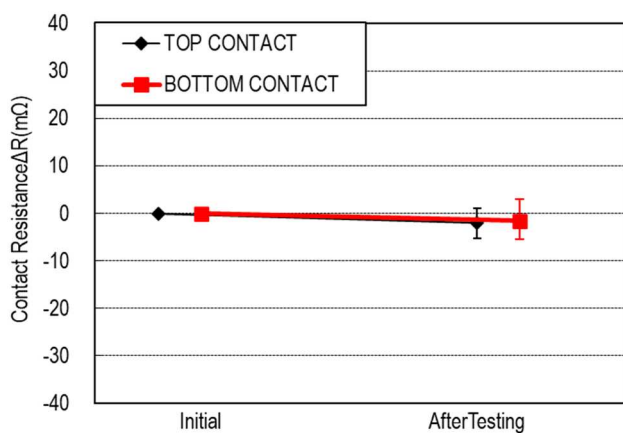
Graph.10 A change of contact resistance
/ J group : High Temp. & High Hum. Life



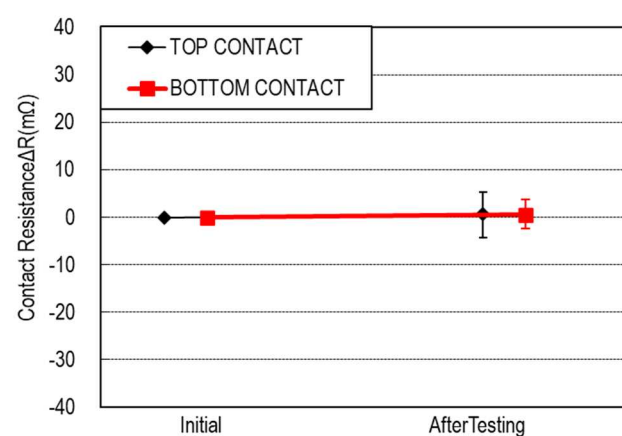
Graph.11 A change of contact resistance / K group : Cold Temp. Life



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



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



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