

# EVAFLEX<sup>®</sup> 5-SE VT

Part No. 20539-0\*\*E-01

## Test Report

Product Specification no. PRS-1620

4	T24018	May 13, 2024	E.Tanaka	M.Muro	T.Masunaga
3	T21144	November 5, 2021	K.Hashimoto	M.Muro	H.Ikari
2	T15080	June 12, 2015	M.Ishimaru	Y.Shimada	E.Kawabe
1	T15008	January 21, 2015	H.Kaneko	J.Tateishi	E.Kawabe
Rev.	ECN	Date	Prepared by	Checked by	Approved by

## 1. Purpose

To evaluate the performance of EVAFLEX5-SE VT in accordance PRS-1620.

## 2. Specimen

2.1. Connector : EVAFLEX 5-SE VT (P/N : 20539-0\*\*E-01)

### 2.2. FFC

(1) Made by Sumitomo Electric Industries, Ltd.

FFC Thickness :  $t=0.30\pm 0.05\text{mm}$  (Actual measurement : 0.30~0.31mm)

Conductor plating : Au over Ni

(2) Made by Hitachi Cable Fine-Tech, Ltd.

FFC Thickness :  $t=0.30\pm 0.05\text{mm}$  (Actual measurement : 0.31~0.33mm)

Conductor plating : Au over Ni

## 3. Conclusion

All the specimen met the requirements of PRS-1620.

## 4. Test Sequence

See Table-1.

## 5. Result

See Table.2-1~2-4 and Graph.1~14.

For the details of the testing conditions and requirements, see PRS-1620.

The Set number in a table means the number of samples, and  $n$  means the number of measurement data.

Table.1 Test Sequence

Test Item	Group																	
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
C/T Resistance	2,6				1,3,5	1,3	1,3	1,3	1,3	1,3	1,5	1,3	1,3	1,3	1,3			
Insulation Resistance											2,6							
D. W. Voltage											3,7							
Temp. Rise																		1
Mating Force	1,5																	
Unmating Force	3,7																	
Durability	4																	
FPC/FFC Retention Force		1																
Contact Retention Force			1															
Hold Down Retention Force				1														
Vibration					2													
Shock					4													
Fretting corrosion						2												
High Temp. Life							2											
High Temp. Operation								2										
Cold Temp. Life									2									
Cold Temp. Operation										2								
High Humidity Life											4							
High Humidity												2						
Thermal Shock													2					
GAS (SO <sub>2</sub> )														2				
Salt Water Spray															2			
Soldering Heat Resistance																1		
Solderability																	1	
Sample QTY.	5 pcs.	5 pcs.	20 pos.	10 pos.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	10 pcs.	10 pcs.	5 pcs.

※The number of group is test sequence.

Table.2-1 Test result

Test Item	Measurements		Spec.	Set	n	DATA					Judge	
						AVE.	MAX.	MIN.	s	X±3s		
A Group Durability	Contact Resistance (mΩ)		Initial	70mΩ MAX.	5	300	30.912	36.34	25.69	2.463	38.301	OK
			After 30th Cycle	ΔR=40mΩ MAX.			-0.727	4.24	-5.63	2.137	5.684	OK
	16P	Mating Force (N)	Initial	9.6N MAX.	5	5	5.479	6.01	4.92	0.387	6.640	OK
			After 30th Cycle	9.6N MAX.			4.488	4.92	4.16	0.273	5.307	OK
		Un-mating Force (N)	Initial	1.44N MIN.	5	5	3.060	3.40	2.90	0.216	2.412	OK
			After 30th Cycle	1.44N MIN.			2.719	2.94	2.47	0.206	2.101	OK
	22P	Mating Force (N)	Initial	13.2N MAX.	5	5	7.628	8.49	7.23	0.526	9.206	OK
			After 30th Cycle	13.2N MAX.			6.432	6.74	6.26	0.181	6.975	OK
		Un-mating Force (N)	Initial	1.98N MIN.	5	5	3.975	4.55	3.65	0.363	2.886	OK
			After 30th Cycle	1.98N MIN.			3.458	3.91	3.19	0.272	2.642	OK
	24P	Mating Force (N)	Initial	14.4N MAX.	5	5	8.217	8.52	7.60	0.362	9.303	OK
			After 30th Cycle	14.4N MAX.			6.896	7.08	6.74	0.146	7.334	OK
		Un-mating Force (N)	Initial	2.16N MIN.	5	5	4.433	4.88	4.03	0.302	3.527	OK
			After 30th Cycle	2.16N MIN.			3.848	4.13	3.47	0.239	3.131	OK
	26P	Mating Force (N)	Initial	15.6N MAX.	5	5	8.793	9.42	8.14	0.457	10.164	OK
			After 30th Cycle	15.6N MAX.			7.402	7.57	7.19	0.152	7.858	OK
		Un-mating Force (N)	Initial	2.34N MIN.	5	5	4.567	5.21	3.89	0.516	3.019	OK
			After 30th Cycle	2.34N MIN.			4.051	4.42	3.54	0.322	3.085	OK
	30P	Mating Force (N)	Initial	18.0N MAX.	5	5	9.302	9.75	8.47	0.548	10.946	OK
			After 30th Cycle	18.0N MAX.			7.937	8.39	7.65	0.291	8.810	OK
		Un-mating Force (N)	Initial	2.70N MIN.	5	5	5.129	5.61	4.75	0.313	4.190	OK
			After 30th Cycle	2.70N MIN.			4.349	5.35	3.73	0.663	2.360	OK
	40P	Mating Force (N)	Initial	24.0N MAX.	5	5	11.570	12.35	10.84	0.648	13.514	OK
			After 30th Cycle	24.0N MAX.			9.865	9.98	9.74	0.088	10.129	OK
Un-mating Force (N)		Initial	3.60N MIN.	5	5	6.549	7.25	6.07	0.430	5.259	OK	
		After 30th Cycle	3.60N MIN.			5.596	6.04	5.31	0.307	4.675	OK	

(※:1.) 16P, 22P, 24P, 26P, 80P are the results of using FFC made by Hitachi Cable Fine Tech, Ltd, and other core numbers are the results of using FFC made by Sumitomo Electric Industries, Ltd.

Table.2-2 Test result

Test Item	Measurements		Spec.	Set	n	DATA					Judge	
						AVE.	MAX.	MIN.	s	X±3s		
A Group Durability	50P	Mating Force (N)	Initial	30.0N MAX.	5	5	14.395	15.42	13.27	0.839	16.912	OK
			After 30th Cycle	30.0N MAX.			11.875	12.29	11.47	0.336	12.883	OK
		Un-mating Force (N)	Initial	4.50N MIN.	5	5	8.135	8.61	7.54	0.399	6.938	OK
			After 30th Cycle	4.50N MIN.			7.472	8.13	6.56	0.700	5.372	OK
	60P	Mating Force (N)	Initial	36.0N MAX.	5	5	17.060	18.14	16.29	0.763	19.349	OK
			After 30th Cycle	36.0N MAX.			13.911	14.23	13.54	0.265	14.706	OK
		Un-mating Force (N)	Initial	5.40N MIN.	5	5	9.219	9.77	8.34	0.535	7.614	OK
			After 30th Cycle	5.40N MIN.			8.615	9.13	7.99	0.459	7.238	OK
	80P	Mating Force (N)	Initial	48.0N MAX.	5	5	24.022	25.35	22.45	1.041	27.145	OK
			After 30th Cycle	48.0N MAX.			19.934	20.59	19.22	0.591	21.707	OK
		Un-mating Force (N)	Initial	7.20N MIN.	5	5	13.748	14.15	12.93	0.511	12.215	OK
			After 30th Cycle	7.20N MIN.			12.045	12.98	11.55	0.579	10.308	OK

(※1.) 16P, 22P, 24P, 26P, 80P are the results of using FFC made by Hitachi Cable Fine Tech, Ltd, and other core numbers are the results of using FFC made by Sumitomo Electric Industries, Ltd.

Table.2-3 Test result

Test Item	Measurements		規格 Spec.	Set	n	DATA					Judge
						AVE.	MAX.	MIN.	s	X±3s	
B Group FPC/FFC Retention Force	16P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	38.130	39.34	36.35	1.094	34.848	OK
		Appearance	No deformation	5	5	No deformation					
	22P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	40.044	41.35	38.54	1.105	36.729	OK
		Appearance	No deformation	5	5	No deformation					
	24P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	40.898	42.16	39.79	0.985	37.943	OK
		Appearance	No deformation	5	5	No deformation					
	26P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	41.173	41.73	40.38	0.517	39.622	OK
		Appearance	No deformation	5	5	No deformation					
	30P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	43.708	45.72	41.95	1.290	39.838	OK
		Appearance	No deformation	5	5	No deformation					
	40P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	44.519	46.24	42.87	1.026	41.441	OK
		Appearance	No deformation	5	5	No deformation					
	50P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	46.213	48.27	44.43	1.359	42.136	OK
		Appearance	No deformation	5	5	No deformation					
	60P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	48.080	50.30	45.70	1.289	44.213	OK
		Appearance	No deformation	5	5	No deformation					
	80P	FPC/FFC Retention Force(N)	25.0N MIN	5	5	51.958	54.00	49.04	1.887	46.297	OK
		Appearance	No deformation	5	5	No deformation					
C Group Contact Retention Force	Contact Retention Force (N)		0.60N MIN.	-	20	0.945	1.31	0.78	0.168	0.441	OK
D Group Hold Down Retention Force	Hold Down Retention Force (N)		1.47N MIN.	-	10	21.198	22.65	20.40	0.195	20.613	OK

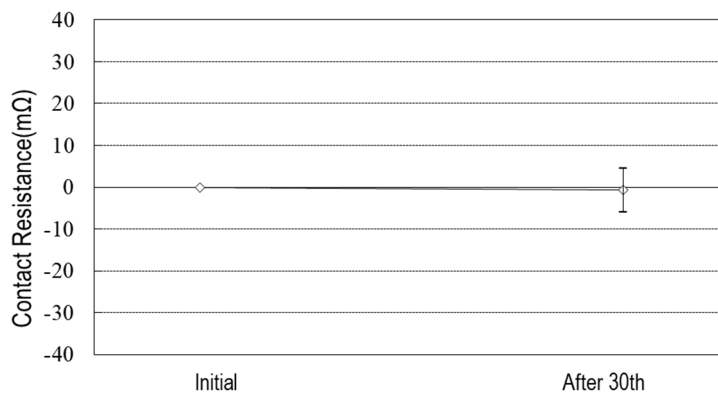
(※:1.) 16P, 22P, 24P, 26P, 80P are the results of using FFC made by Hitachi Cable Fine Tech, Ltd, and other core numbers are the results of using FFC made by Sumitomo Electric Industries, Ltd.

Table.2-4 Test result

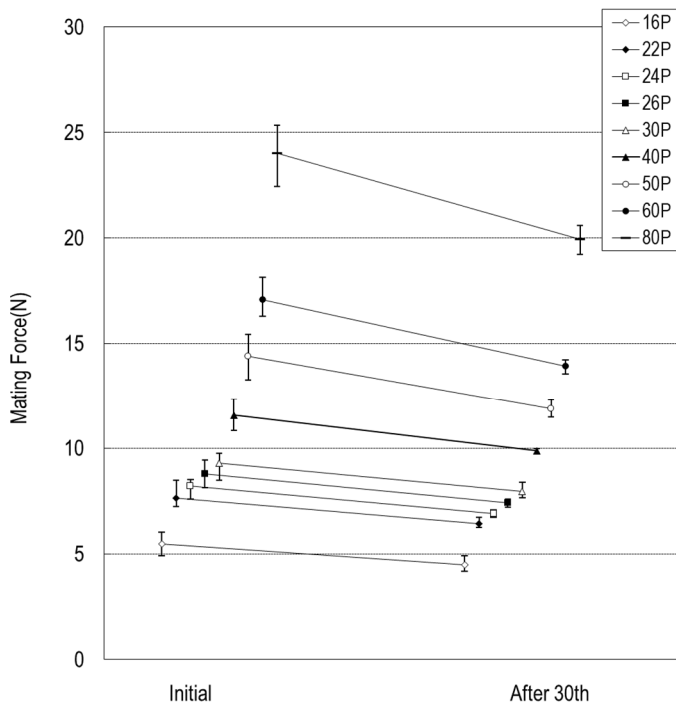
Test Item	Measurements		Spec.	Set	n	DATA					Judge
						AVE.	MAX.	MIN.	s	X±3s	
E Group Vibration & Shock	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	30.568	34.35	26.66	1.728	35.752	OK
		After Vibration	ΔR=40mΩ MAX.			-1.005	2.96	-4.83	1.778	4.329	OK
		After Shock				-0.587	3.67	-4.8	1.829	4.9	OK
	Electrical Discontinuity	During Vibration	1μsec. MAX.	5	5	No discontinuity					OK
		During Shock				No discontinuity					OK
	Appearance	After Vibration	No abnormality adversely affecting the performance shall occur.	5	5	No abnormality					OK
After Shock		No abnormality					OK				
F Group Fretting corrosion	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	27.757	31.51	23.95	1.678	32.791	OK
		After Testing	ΔR=40mΩMAX.			-0.808	4.26	-5.50	2.073	5.411	OK
	Appearance	After Testing	No abnormality adversely affecting the performance shall occur.	5	5	No abnormality					OK
G Group High Temp. Life	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	31.657	36.76	26.64	2.154	38.119	OK
		After Testing	ΔR=40mΩMAX.			0.301	6.33	-5.74	2.861	8.884	OK
H Group High Temp. Operation	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	26.297	31.43	20.81	2.349	33.344	OK
		After Testing	ΔR=40mΩMAX.			3.235	9.77	-2.89	2.837	11.746	OK
J Group Cold Temp. Life	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	31.302	36.50	26.22	2.333	38.301	OK
		After Testing	ΔR=40mΩMAX.			1.712	6.58	-2.81	2.086	7.970	OK
K Group Cold Temp. Operation	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	30.835	35.06	26.75	1.865	36.430	OK
		After Testing	ΔR=40mΩMAX.			2.327	7.42	-2.49	2.136	8.735	OK
L Group High Humidity Life	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	29.872	34.95	25.15	2.129	36.259	OK
		After Testing	ΔR=40mΩMAX.			0.285	4.61	-3.82	1.885	5.940	OK
	Insulation Resistance (MΩ)	Initial	500MΩ MIN.	5	150	10×10 <sup>4</sup> MΩ MIN.					OK
		After Testing	500MΩ MIN.			3×10 <sup>3</sup> MΩ MIN.					OK
	D.W.Voltage	Initial	No abnormality adversely affecting the performance shall occur.	5	150	No abnormality					OK
		After Testing				No abnormality					OK
M Group High Humidity	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	32.144	36.31	27.85	1.942	37.970	OK
		After Testing	70mΩ MAX.			-1.314	4.82	-7.90	2.956	7.554	OK
N Group Thermal Shock	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	30.396	34.36	26.10	1.790	35.766	OK
		After Testing	ΔR=40mΩMAX.			-0.405	2.94	-3.98	1.575	4.320	OK
P Group GAS (SO2)	Contact Resistance (mΩ)	Initial	70mΩ MAX.	5	300	30.950	37.46	24.58	2.948	39.794	OK
		After Testing	ΔR=40mΩMAX.			-0.359	7.89	-9.57	3.884	11.293	OK

Table.2-5 Test result

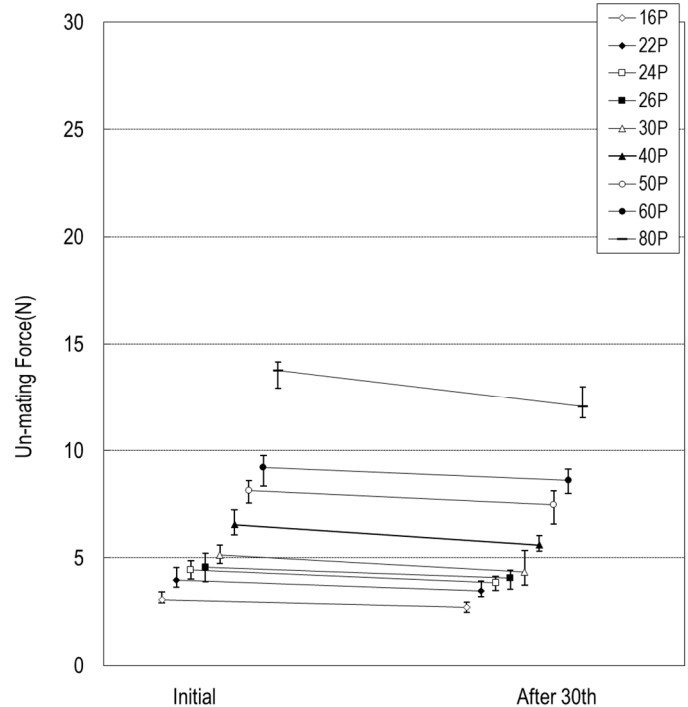
Test Item	Measurements		Spec.	Set	n	DATA					Judge
	Contact Resistance (mΩ)	Initial				After Testing					
Q Group Salt Water Spray			Initial	70mΩ MAX.	5	300	32.815	39.45	26.36	2.923	41.584
	After Testing		$\Delta R=40m\Omega$ MAX.	-0.013			3.37	-3.52	1.425	4.262	OK
R Group Soldering Heat Resistance	Appearance		No abnormality	10	10	No abnormality					OK
S Group Solderability	Appearance		Fillet is made (Fillet angle $\leq 90^\circ$ )	10	10	No problem					OK
T Group Temperature Rise	0.35A/Pin(60Pin)		$\Delta T=30K$ MAX.	5	5	$\Delta T=21.7K$ MAX.					OK
	0.50A/Pin(15Pin)		$\Delta T=30K$ MAX.	5	5	$\Delta T=23.5K$ MAX.					OK



Graph1. A change of contact resistance (A Group:Durability)

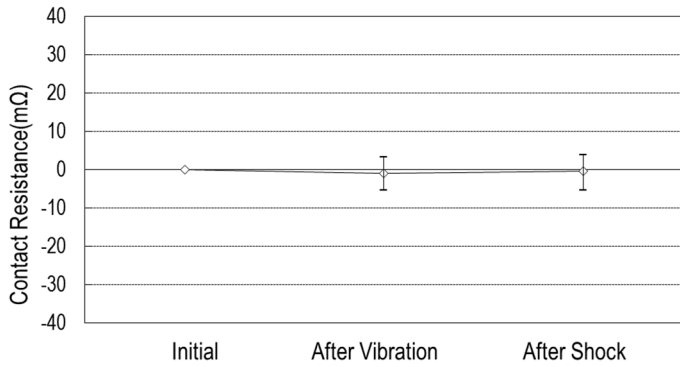


Graph2. A change of mating force (A Group:Durability)

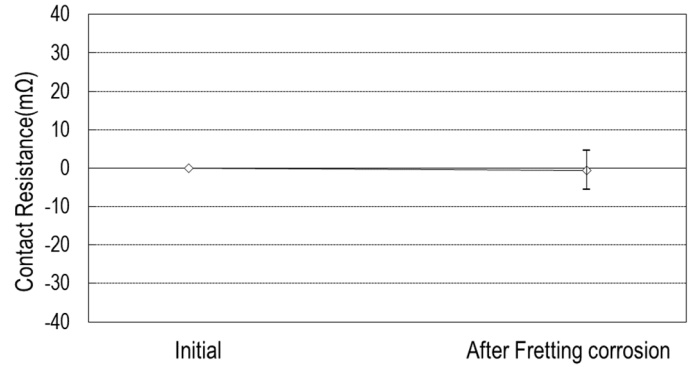


Graph3. A change of un-mating force (A Group:Durability)

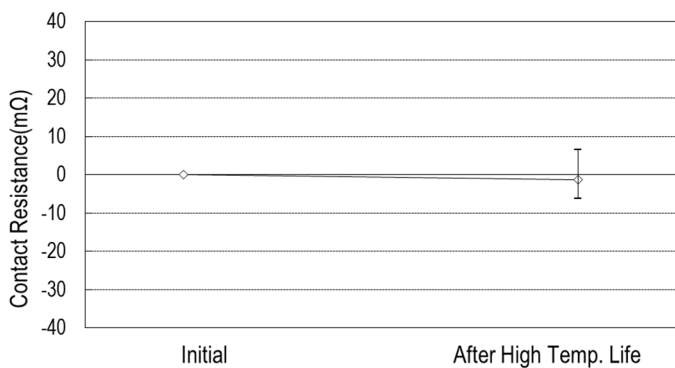




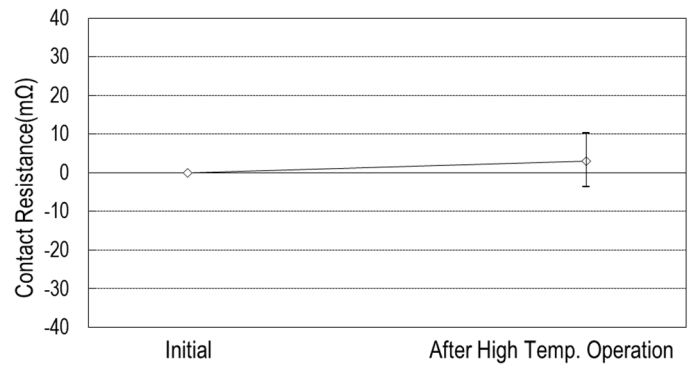
Graph4. A change of contact resistance  
(E Group: Vibration & Shock)



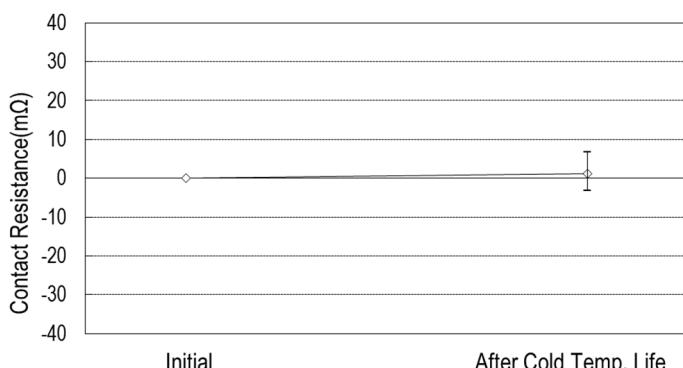
Graph5. A change of contact resistance  
(F Group: Fretting corrosion)



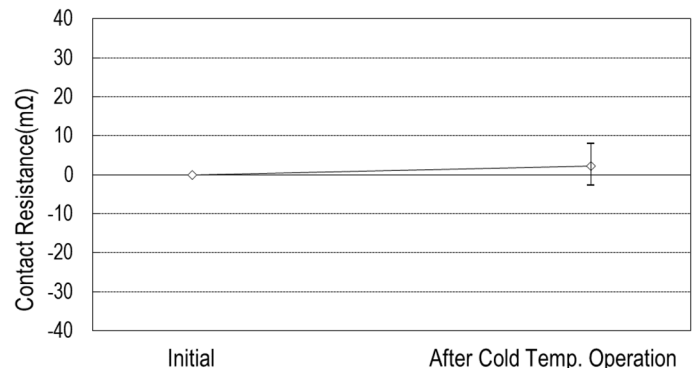
Graph6. A change of contact resistance  
(G Group: High Temp. Life)



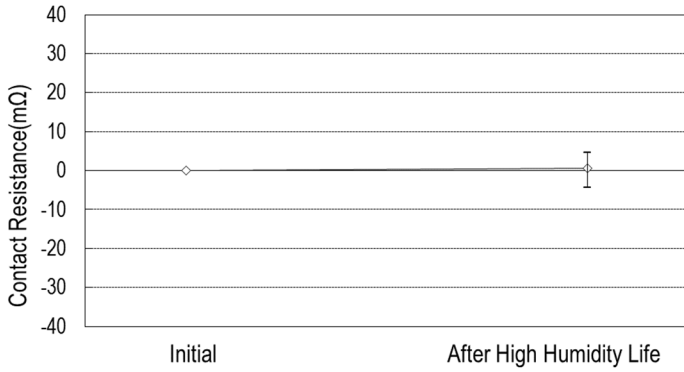
Graph7. A change of contact resistance  
(H Group: High Temp. Operation)



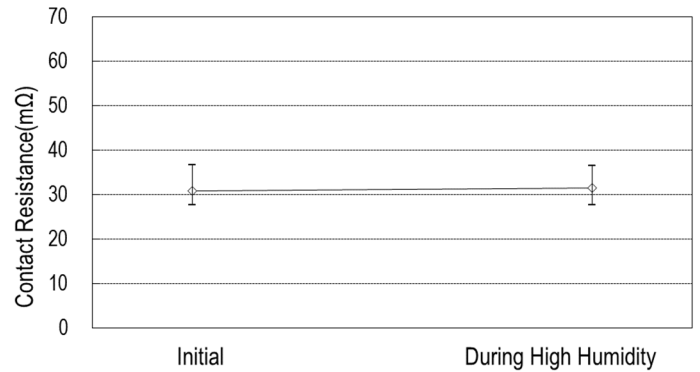
Graph8. A change of contact resistance  
(J Group: Cold Temp. Life)



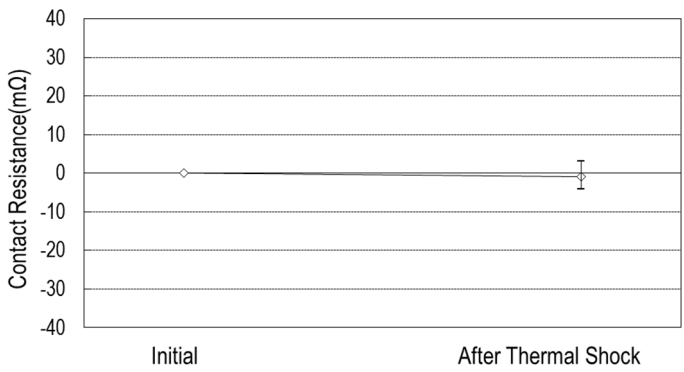
Graph9. A change of contact resistance  
(K Group: Cold Temp. Operation)



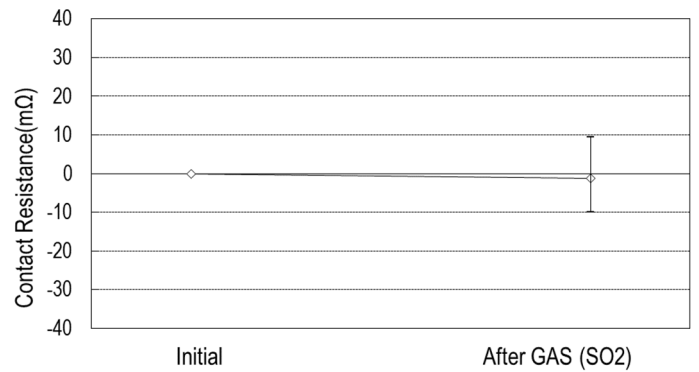
Graph10. A change of contact resistance  
(L Group:High Humidity Life)



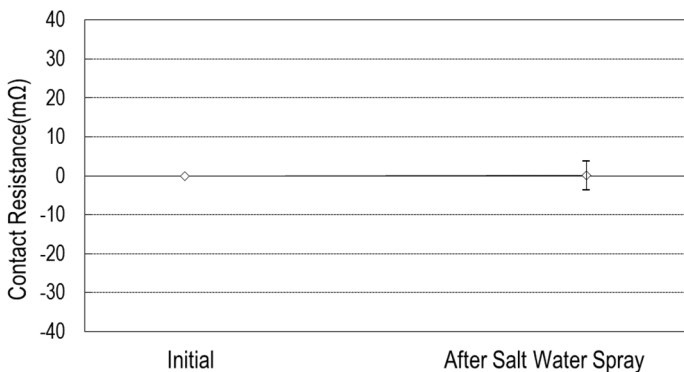
Graph11. A change of contact resistance  
(M Group:High Humidity)



Graph12. A change of contact resistance  
(N Group:Thermal Shock)



Graph13. A change of contact resistance  
(P Group:GAS (SO2))



Graph14. A change of contact resistance  
(Q Group:Salt Water Spray)