

**承 認 願**  
**HIROSE CONNECTORS**

국제통신부품(주) 貴中

品名 : DM1AA-SF-PEJ(21)

業體承認	發 送
	

**히로세코리아株式会社**  
**HIROSE KOREA CO., LTD.**

参考図：ご確認用。正式には別途納入仕様書をご請求願います。





△の数	訂正記事	担当	検図	年月日	△の数	訂正記事	担当	検図	年月日
△					△				
△					△				
適用規格		SD Card Specifications Ver 1.0							
定格	使用温度範囲	-25℃ ~ +85℃ (注1)			保存温度範囲	-40℃ ~ +85℃			
	電圧	AC 125V			使用湿度範囲	相対湿度95%以下 (ただし、結露しないこと。)			
	電流	0.5A							
<b>性能</b>									
	項目	試験方法			規格			QT	AT
構造	外觀・構造・仕上げ	目視、寸法測定器にて測定する。			図面と合致していること。			○	○
	表示	目視にて確認する。						○	○
電気的 性能	低電圧、低電流下の接触抵抗 IEC60512-2-2a	開放電圧20 mV、試験電流1 mA で測定する。			100mΩ以下 (初期値)。(注2)			○	-
	耐電圧 IEC60512-2-4a	AC 500Vrmsの電圧を1分間印加する。			①せん絡・絶縁破壊がないこと。 ②漏洩電流1mA以下。			○	○
	絶縁抵抗 IEC60512-2-3a	DC 500Vの電圧を印可し1分以内に測定する。			1000MΩ以上 (初期値)。			○	-
機械的 性能	カード挿入力	スピード 25mm/minにて適合カードで測定する。			初期：10N以下。挿抜寿命後：10N以下。			○	-
	挿抜寿命 (7/15環境) EIA364b class1.1	毎時 400~600回の速度で、10,000回の挿抜を行う。			①接触抵抗：初期からの変化量 40mΩ以下。 (挿抜により接触抵抗値が復帰すれば可。) ②極度の摩耗や破損等の異常がないこと。			○	-
	振動・高周波 IEC60512-4-6d	片振幅0.75mm、周波数10~55~10Hzの振動をX、Y、Z軸3方向各2時間加える。			①100ns以上の瞬断がないこと。 ②破損、ひび、部品のゆるみがないこと。			○	-
環境的 性能	衝撃 IEC60512-4-6c	加速度490m/s <sup>2</sup> 、持続時間11msの正弦半波で3方向各3回の衝撃を加える。			①100ns以上の瞬断がないこと。 ②破損、ひび、部品のゆるみがないこと。			○	-
	温湿度サイクル IEC60512-6-11m	1サイクル 24時間で 10サイクルの嵌合放置をする。			①接触抵抗：初期からの変化量 40mΩ以下。 ②絶縁抵抗：100MΩ以上。 ③機能を損なう腐食や破損等の異常なきこと。			○	-
			<p>温度上昇の終わり 温度下降の始まり</p> <p>相対湿度% 100% 95% 90% 95% 100%</p> <p>15min 15min 15min 15min</p> <p>+40又は+55 上限温度 +2°C 上限温度 -2°C</p> <p>1/2h 1/2h 3h 12±1/2h 3/2h 6h 24h</p> <p>+28°C +22°C</p>						
備考				製図	担当	検図	承認	出図	
(注1) 通電による温度上昇を含む。 (注2) 接触抵抗は導体抵抗を含む。 規定無き場合は温度15℃~35℃、気圧86~106kPa、湿度25~85%の試験環境下にて実施のこと。									
注 QT:確認試験 AT:製品検査 ○:適用項目									
<b>HS</b> ヒロセ電機株式会社 HIROSE ELECTRIC CO., LTD.		<b>製品規格表</b>			製品名 DM1AA-SF-PEJ (21)				
IECL	図番	製品コード							1
CL	SLC4-153736-01	CL609-0004-8-21							2



TO  
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参考図：ご確認用。正式には別途納入仕様書をご請求願います。

性		能	
項目	試験方法	規格	QT AT
熱衝撃 IEC60512-6-11d	温度 -55~ +85°C、変化時間 5分以内で 5サイクル (1サイクル=1h) の嵌合放置をする。	①接触抵抗：初期からの変化量 40mΩ以下 ②絶縁抵抗：100MΩ以上 ③機能を損なう腐食や破損等の異常なきこと。	○ -
耐熱性 IEC60512-6-11i	温度 +85°Cに 96hの嵌合放置をする。	①接触抵抗：初期からの変化量 40mΩ以下 ②絶縁抵抗：100MΩ以上 ③機能を損なう腐食や破損等の異常なきこと。	○ -
耐寒性 IEC60512-6-11j	温度 -25°Cに 96hの嵌合放置をする。	①接触抵抗：初期からの変化量 40mΩ以下 ②絶縁抵抗：100MΩ以上 ③機能を損なう腐食や破損等の異常なきこと。	○ -
耐湿 (定常状態) IEC60512-6-11c	温度+40°C、湿度 90~95%RH中に96hの嵌合放置をする。	①接触抵抗：初期からの変化量 40mΩ以下 ②絶縁抵抗：100MΩ以上 ③機能を損なう腐食や破損等の異常なきこと。	○ -
硫化水素ガス JEIDA 38	温度+40°C、湿度80%RH、H <sub>2</sub> S 3ppmのガス中に 96hの嵌合放置をする。	①接触抵抗：初期からの変化量 40mΩ以下 ②絶縁抵抗：100MΩ以上 ③機能を損なう腐食や破損等の異常なきこと。	○ -
塩水噴霧 JIS C 5402 7.1	温度35±2°C、5±1%の塩水噴霧中に48時間の 嵌合放置をする。(後処理:塩の付着物を水洗 い後、室温に24時間放置)	①機能を損なう腐食や破損等の異常なきこと。	○ -

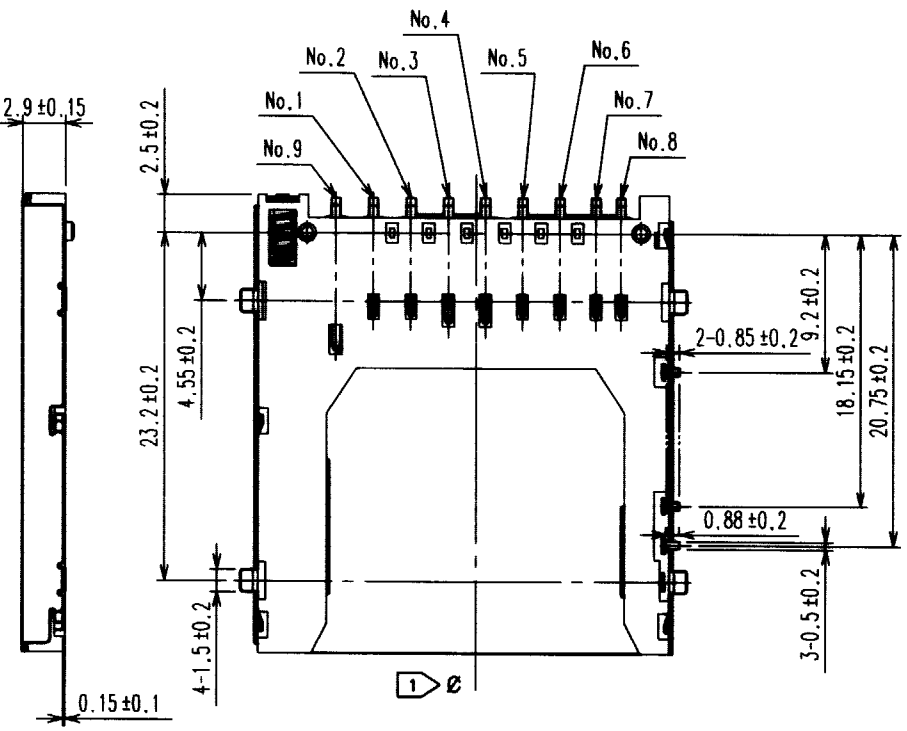
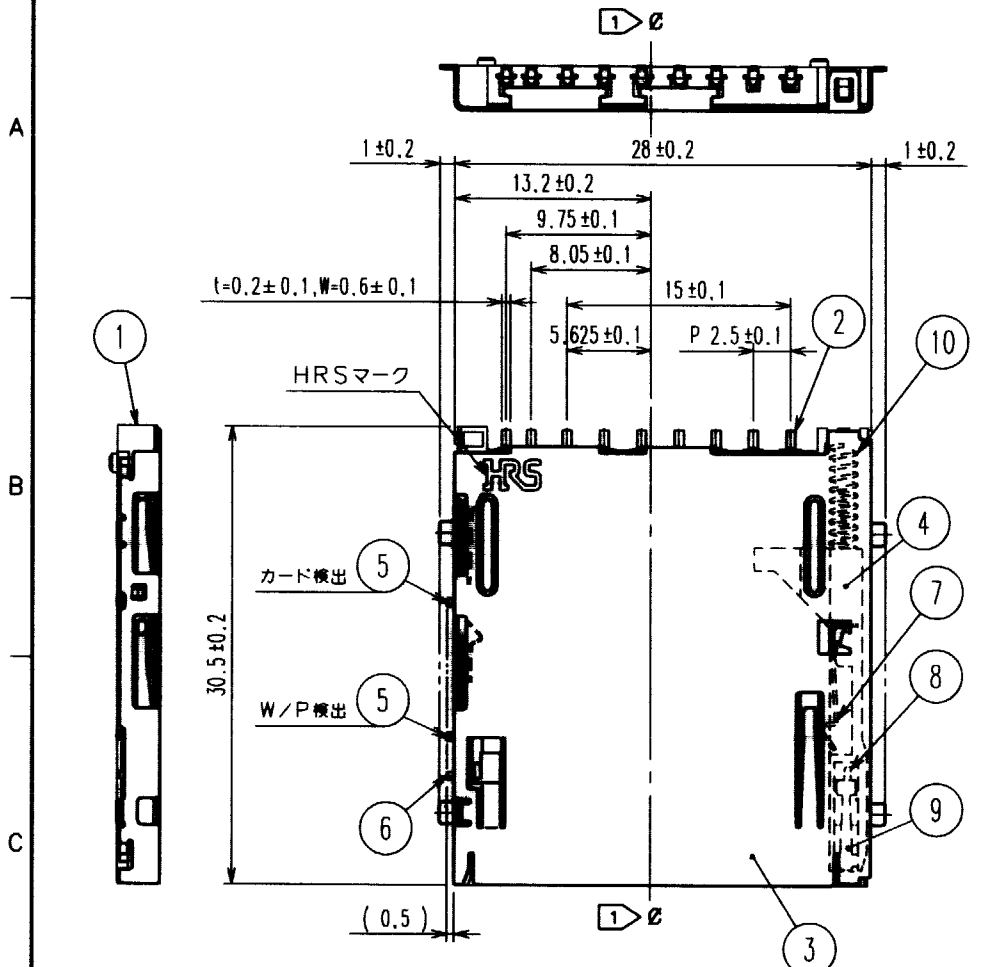
備考 (注1) 通電による温度上昇を含む。 (注2) 接触抵抗は導体抵抗を含む。 規定無き場合は温度15°C~35°C、気圧86~106kPa、 湿度25~85%の試験環境下にて実施のこと。	製 図	担 当	検 図	承 認	出 図
					

注 QT:確認試験 AT:製品検査 ○:適用項目					
<b>HRS</b> ヒロセ電機株式会社 HIROSE ELECTRIC CO., LTD.		<b>製品規格表</b>		製品名 DM1AA-SF-PEJ (21)	
旧CL CL	図番 SLC4-153736-01	製品コード CL609-0004-8-21		2 2	

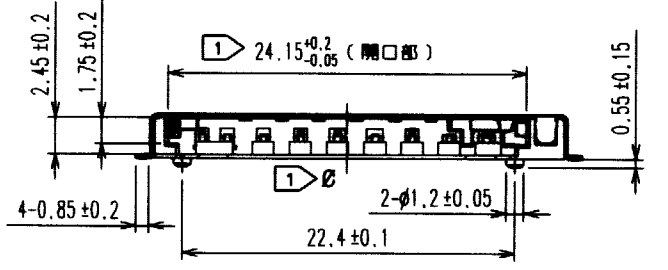
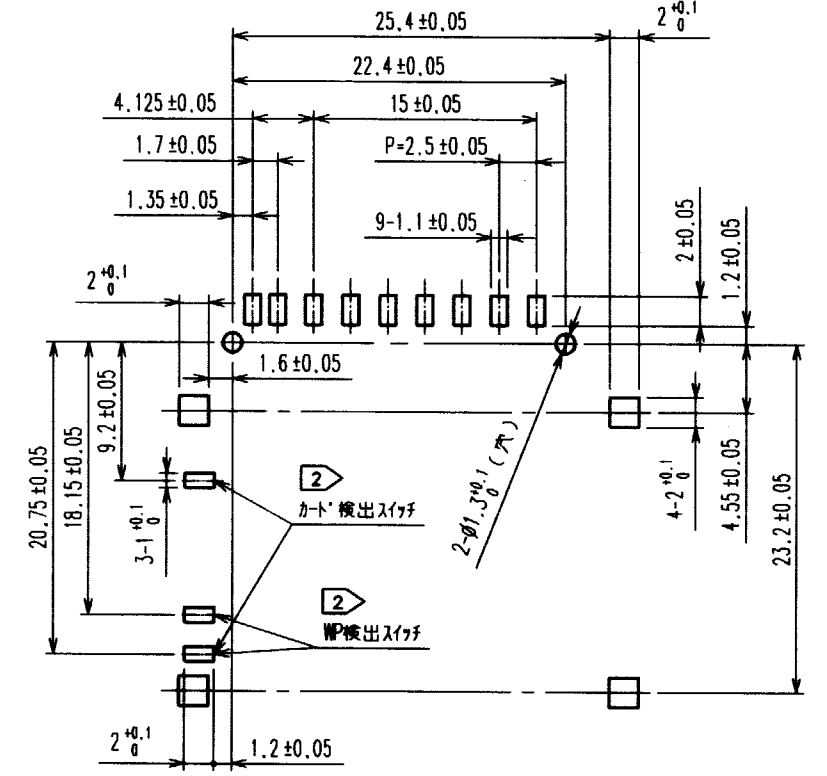


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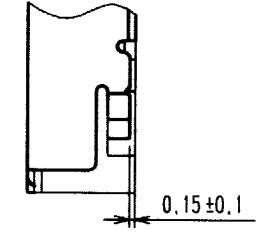
Δの取 COUNT	訂正記事 DESCRIPTION OF REVISIONS	設計検閲 BY CHKD	年月日 DATE	Δの取 COUNT	訂正記事 DESCRIPTION OF REVISIONS	設計検閲 BY CHKD	年月日 DATE



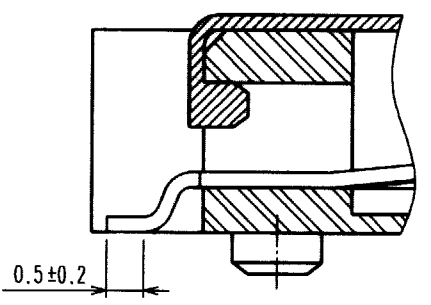
推奨ランド寸法図 (突装面側)



部番3の基板面までの距離 (FREE)



リード平坦部寸法 (FREE)



注 ① φは、カード挿入口のセンターラインとする。  
 ② カード検出スイッチ及びW/P検出スイッチの検知方式は、下記に示す。

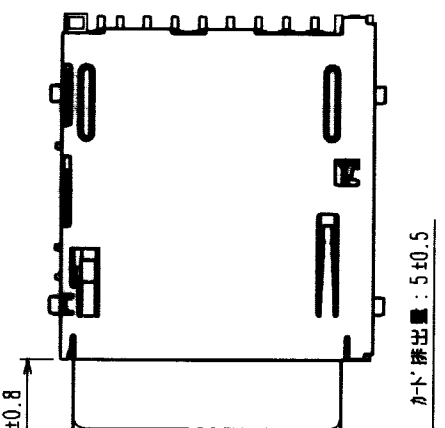
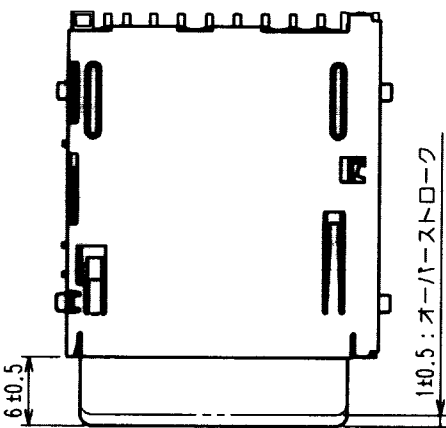
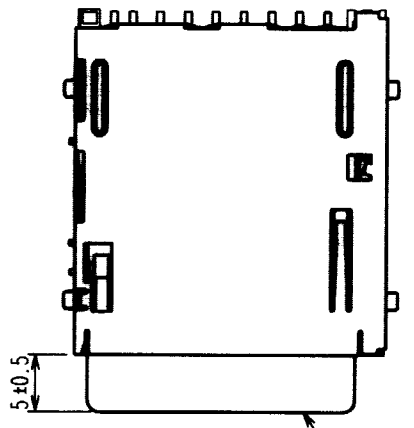
カード検出スイッチ		W/P検出スイッチ			
カード未挿入	カード挿入	カード未挿入	カード挿入		
			WRITE PROTECT	WRITE ENABLE	
オープン	クローズ	オープン	オープン	クローズ	
部番5 (カード検出)	部番6 (カード検出)	部番5 (W/P検出)	部番6 (W/P検出)	部番5 (W/P検出)	部番6 (W/P検出)

3 突装部の平坦度は、0.1MAXとする。  
 4 コネクタ単体の質量：2.2g

カード押し切り状態

カードかん合状態

カード挿出状態



3	ステンレス鋼	突装部: Ni0.5μm+Sn1μm	10	硬鋼線	Ni3μm
2	銅合金	接触部: Ni2μm+AuPO.2μm 突装部: Ni2μm+SnCu1μm	7~9	ステンレス鋼	
1	LCP	BLACK UL94V-0	5,6	銅合金	接触部: Ni2μm+AuPO.2μm 突装部: Ni2μm+SnCu1μm
部番	材質	処理, 備考	部番	材質	処理, 備考

備考 REMARKS	製図 DRAWN	設計 DESIGNED	検閲 CHECKED	承認 APPROVED	出図 RELEASED
	12/6	12/6	12/9	12/9	
		山口	山口	山口	

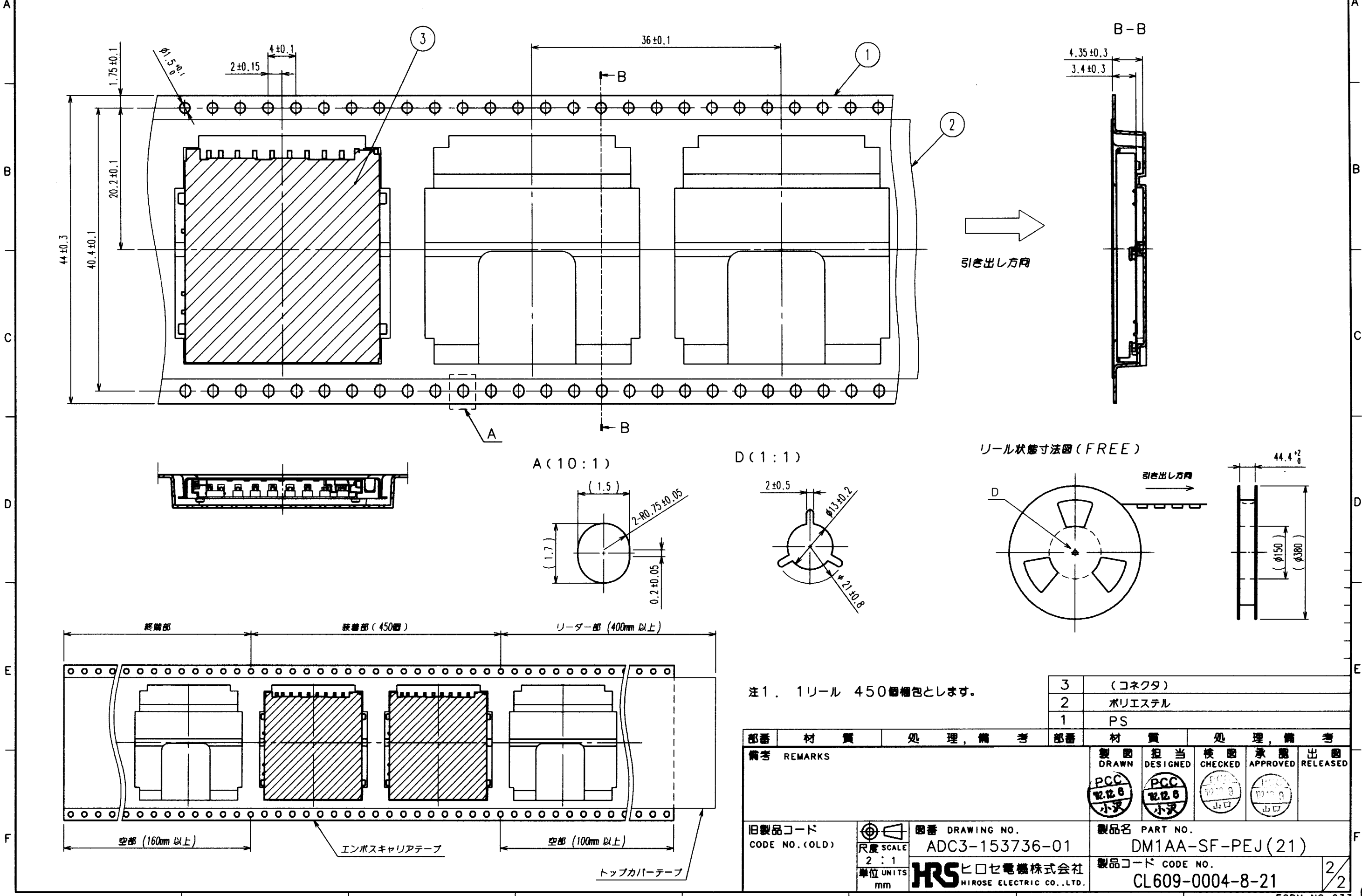
旧製品コード CODE NO. (OLD) CL	図番 DRAWING NO. ADC3-153736-01	製品名 PART NO. DM1AA-SF-PEJ(21)
CL	尺度 SCALE 2:1 単位 UNITS mm	製品コード CODE NO. CL609-0004-8-21
	HRS ヒロセ電機株式会社 HIROSE ELECTRIC CO., LTD.	1/2

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参考図：ご確認用。正式には別途納入仕様書をご請求願います。

TO

Δの數		訂正記事	担当検図	年月日	Δの數		訂正記事	担当検図	年月日
COUNT	DESCRIPTION OF REVISIONS	BY	CHKD	DATE	COUNT	DESCRIPTION OF REVISIONS	BY	CHKD	DATE
△					△				
△					△				
△					△				



リール状態寸法図 (FREE)

注1. 1リール 450個梱包とします。

3	(コネクタ)
2	ポリエステル
1	PS

部番	材質	処理, 備考	部番	材質	処理, 備考
備考 REMARKS			製図 DRAWN	担当 DESIGNED	検図 CHECKED
			製図 小沢	担当 小沢	検図 山口
			承認 APPROVED	承認 山口	出図 RELEASED
			承認 山口	承認 山口	出図
旧製品コード CODE NO. (OLD)	図番 DRAWING NO.	製品名 PART NO.	製品コード CODE NO.		
	ADC3-153736-01	DM1AA-SF-PEJ(21)	CL609-0004-8-21		
尺度 SCALE 2:1 単位 UNITS mm	HRS 日ロセ電機株式会社 HIROSE ELECTRIC CO., LTD.			2/2	

TR609E-1501

QUALITY CONFORMANCE  
TEST REPORT  
FOR  
CONNECTORS  
DM1A SERIES

April 2002

<b>HRS</b> HIROSE ELECTRIC CO.,LTD. Engineering Center	Written by	Charged by	Checked by	Approved by
	<i>Y. Takano</i> '02.04.25	<i>M. Ojawa</i> '02.04.26	<i>M. Yamaguchi</i> 02.04.26	<i>M. Yamaguchi</i> 02.04.26

- [1] Objective  
To assess the performance and quality of the connectors, DM1A-SF-PEJ.
- [2] Specimens  
DM1A-SF-PEJ  
SD card manufactured by Matsushita.
- [3] Test period  
From: 2002-01-17  
To: 2002-04-01
- [4] Test item, Number of specimens, Page No.

Test item No.	Test item/ (Applicable standard)	Group												Number of Specimens	Page No.	
		A	B	C	D	E	F	G	H	I	J	K	L			
1	Appearance, Construction (JIS C 5402 4.1 4.3)	○	○	○	○	○	○	○	○	○	○	○	○	○	45 pairs	24
2	Contact resistance (IEC 512-2-2a)	○	○	○	○		○	○	○	○	○	○	○	40 pairs	25	
3	Insulation resistance (IEC 512-2-39)		○	○	○		○	○	○		○	○		5 pairs	26	
4	Voltage proof (IEC 512-2-4a)				○						○			5 pairs	28	
5	Insertion and withdrawal forces (JIS C 5402 6.6)									○				5 pairs	30	
6	Vibration (Condition 1) (IEC 512-4-6d)	○												5 pairs	31	
7	Shock (IEC 512-4-6c)	○												5 pairs	32	
8	Cold (IEC 512-6-11j)		○											5 pairs	33	
9	Dry heat (IEC 512-6-11i)			○										5 pairs	34	
10	Damp heat (IEC 512-6-11c)				○									5 pairs	35	
11	Corrosion, salt mist (JIS C 5402 7.1)					○								5 pairs	36	
12	Thermal shock (IEC 512-6-11d)						○							5 pairs	37	
13	Corrosion, H <sub>2</sub> S gas (JEADA 38)							○						5 pairs	38	

14	Contact creep	Mechanical operation, 10 times																○	5 pairs	39	
		Dry heat																			○
		Damp heat																			○
		Damp heat, cyclic																			○
15	Mechanical operation, 10000 times (EIAJ 364b class 1.1)																	○	5 pairs	41	
16	Damp heat, cyclic (IEC 512-6-11m)																	○	5 pairs	43	
17	Harsh environmental (JIS C 5402 6.3 EIA 364b class 1.3)																	○	5 pairs	45	
18	Vibration (Condition 2) (JIS C 5402 6.1)																	○	5 pairs	47	
19	Temperature rise (IEC 512-3-5a)	M																5 pairs	48		
20	Resistance to soldering heat (JIS C 5402 7.12)	N																5 pairs	50		
21	Resistance to flux penetration	O																5 pairs	52		
22	Contact retention force	P																5 pieces	54		
23	Card insertion force with reverse side	Q																15 pairs	55		
24	Card wrenching strength	R																8 pairs	57		



Table for each test measurement item

Test item No.	Test item	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
6	Vibration (Condition 1)	○	○				○	○			
7	Shock	○	○				○				
8	Cold	○	○	○							
9	Dry heat	○	○	○							
10	Damp heat	○	○	○	○						
11	Corrosion, salt mist	○									
12	Thermal shock	○	○	○							
13	Corrosion, H <sub>2</sub> S gas	○	○	○							
14	Contact Creep	Mechanical operation	○	○							
		Dry heat	○	○	○						
		Damp heat	○	○	○						
		Damp heat, cyclic	○	○	○						
15	Mechanical operation, 10000 times	○	○			○					
16	Damp heat, cyclic	○	○	○							
17	Harsh environmental	○	○	○							
18	Vibration (Condition 2)	○	○								
19	Temperature rise								○		
20	Resistance to soldering heat	○	○	○	○						
21	Resistance to flux penetration	○	○	○	○						
22	Contact retention force									○	
23	Card insertion force with reverse side										○
24	Card wrenching strength										○

- Remarks:
- (1) Appearance, Construction
  - (2) Contact resistance
  - (3) Insulation resistance
  - (4) Voltage proof
  - (5) Insertion and withdrawal forces
  - (6) Electrical discontinuity
  - (7) Variation of contact resistance
  - (8) Temperature rise
  - (9) Retention force
  - (10) Breaking strength

[5] Test results

See the page which describes each test item.

Contact resistance graphs and result data

See page 6 for Group A.

See page 7 for Group B.

See page 8 for Group C.

See page 9 for Group D.

See page 10 for Group F.

See page 11 for Group G.

See page 12 for Group H.

See pages 13 to 15 for Group I.

See page 16 for Group J.

See page 17 for Group K.

See page 18 for Group L.

Insulation resistance result data

See page 19 for Groups B and C.

See page 20 for Groups D and F.

See page 21 for Groups G and H.

See page 22 for Groups J and K.

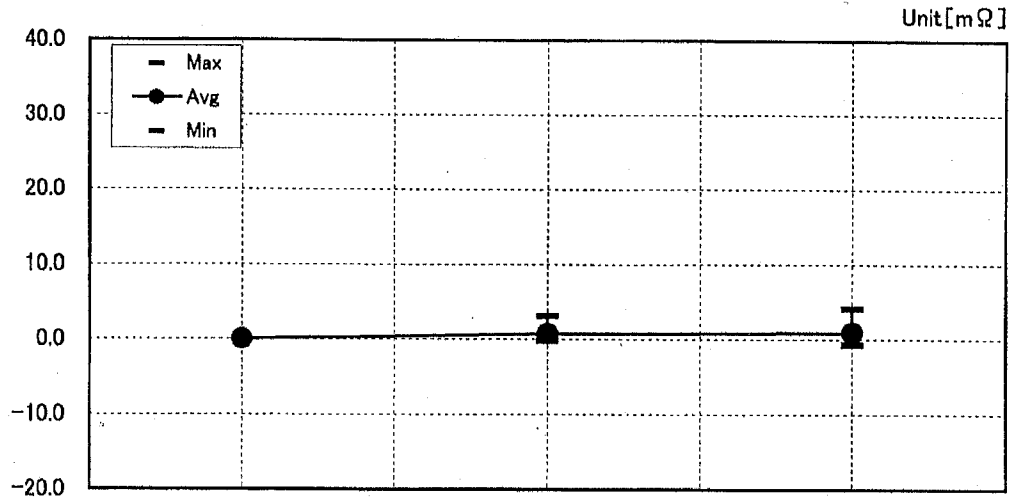
Insertion and withdrawal forces graph and result data

See page 23 for Group I.

Group A  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

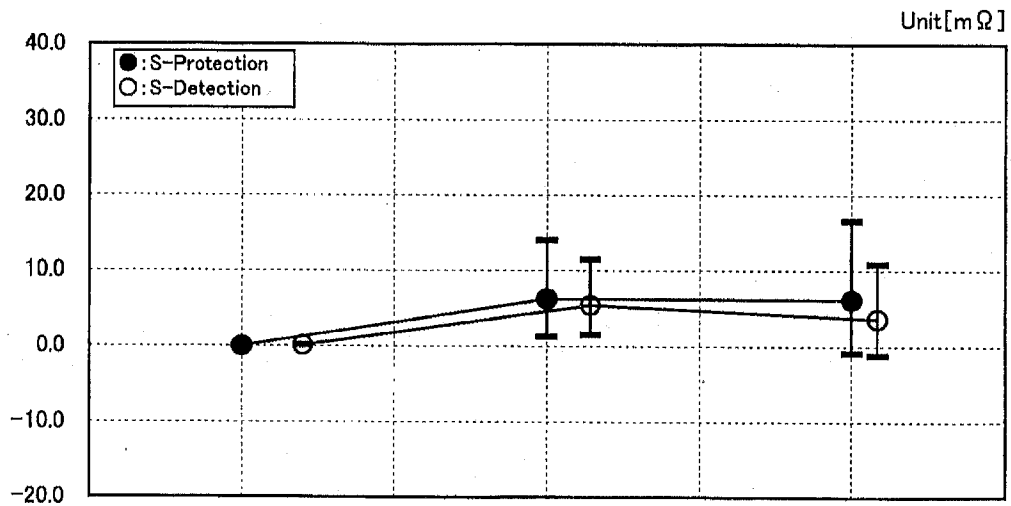
TR609E-1501



Step →	Initial Measured value	Vibration (Condition 1)	Shock
Max	23.5	3.1	4.1
Min	18.0	-0.20	-0.7
Avg	20.28	0.75	0.88
$\sigma_{n-1}$	1.21	0.85	1.10

Group A  
Contact resistance  
SW contact

Requirements:  
Check.

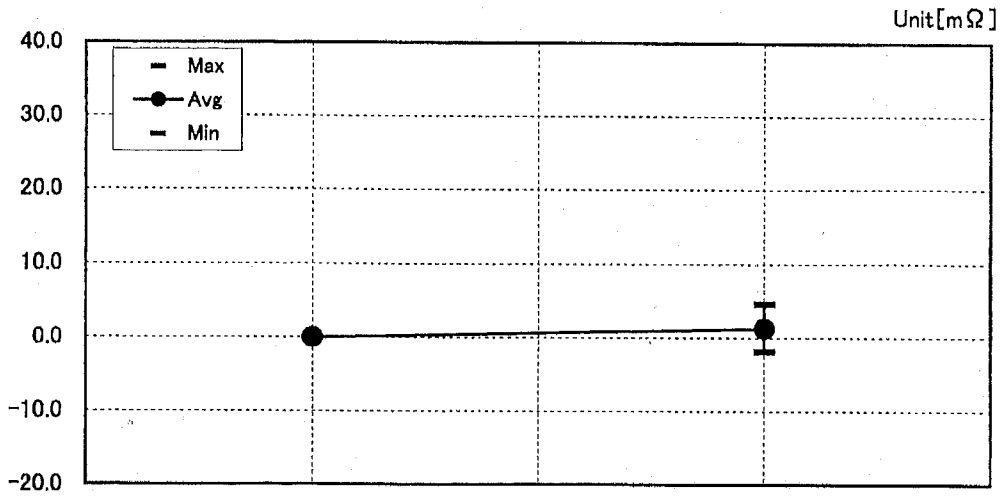


Step →	Initial Measured value	Vibration (Condition 1)	Shock	
●	Max	58.6	14.0	16.6
	Min	42.6	1.30	-0.90
	Avg	48.44	6.2	6.1
	$\sigma_{n-1}$	6.17	5.64	7.22
○	Max	68.6	11.1	10.5
	Min	45.5	1.4	-1.3
	Avg	59.00	5.2	3.4
	$\sigma_{n-1}$	9.92	3.8	4.8

Group B  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

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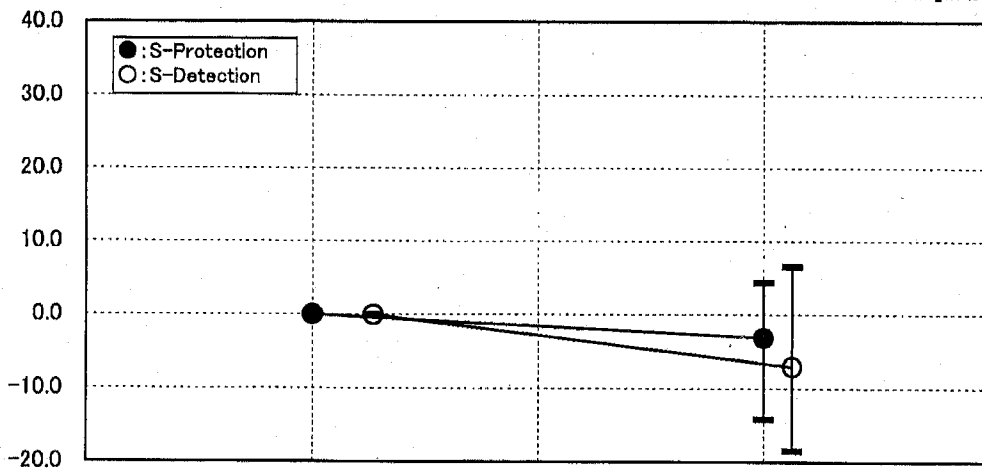


Step →	Initial Measured value	Cold
Max	23.7	4.6
Min	16.7	-1.9
Avg	20.00	1.28
$\sigma_{n-1}$	1.63	1.34

Group B  
Contact resistance  
SW contact

Requirements:  
Check.

Unit[mΩ]

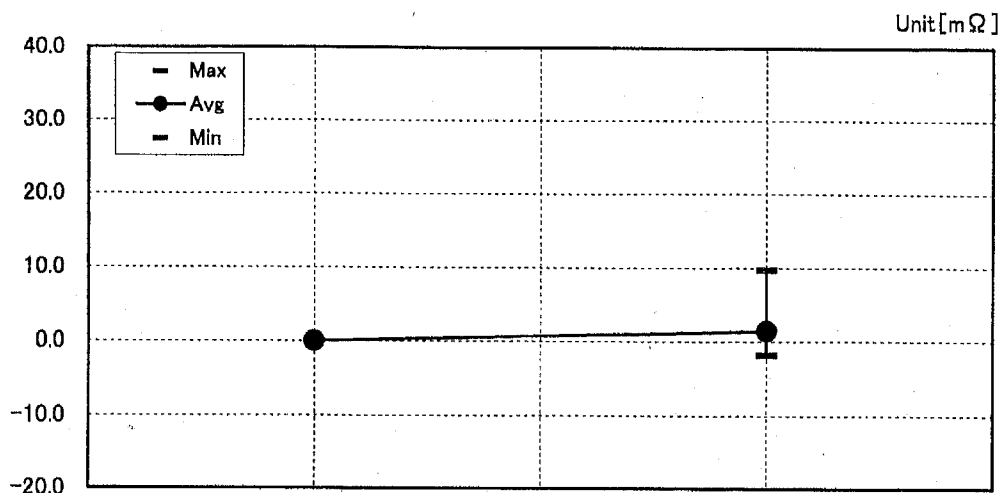


Step →	Initial Measured value	Cold
●: Max	67.6	4.4
Min	41.6	-14.2
Avg	50.72	-3.08
$\sigma_{n-1}$	9.92	6.91
○: Max	70.1	6.4
Min	41.2	-18.0
Avg	58.42	-6.84
$\sigma_{n-1}$	11.28	10.08

Group C  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

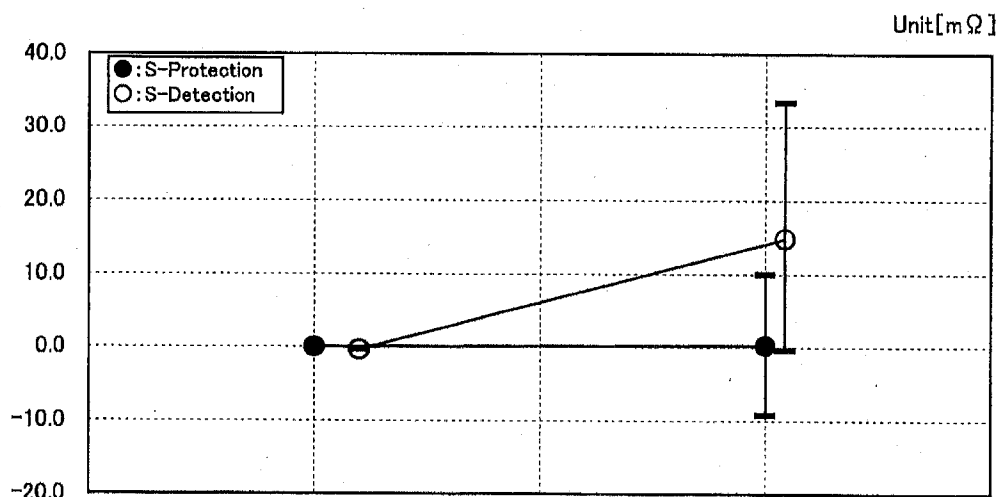
TR609E-1501



Step →	Initial Measured value	Dry heat
Max	23.7	9.7
Min	16.7	-1.8
Avg	20.00	1.42
$\sigma_{n-1}$	1.63	1.86

Group C  
Contact resistance  
SW contact

Requirements:  
Check.

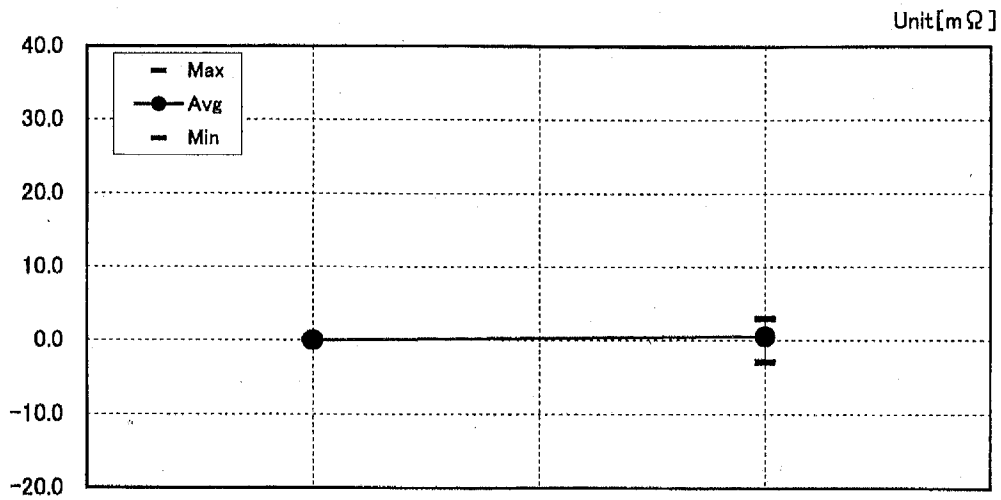


Step →	Initial Measured value	Dry heat
●: Max	54.8	10.0
Min	37.4	-9.2
Avg	44.94	0.26
$\sigma_{n-1}$	7.42	7.47
○: Max	61.4	32.2
Min	47.3	0.0
Avg	53.36	14.54
$\sigma_{n-1}$	5.81	15.26

Group D  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

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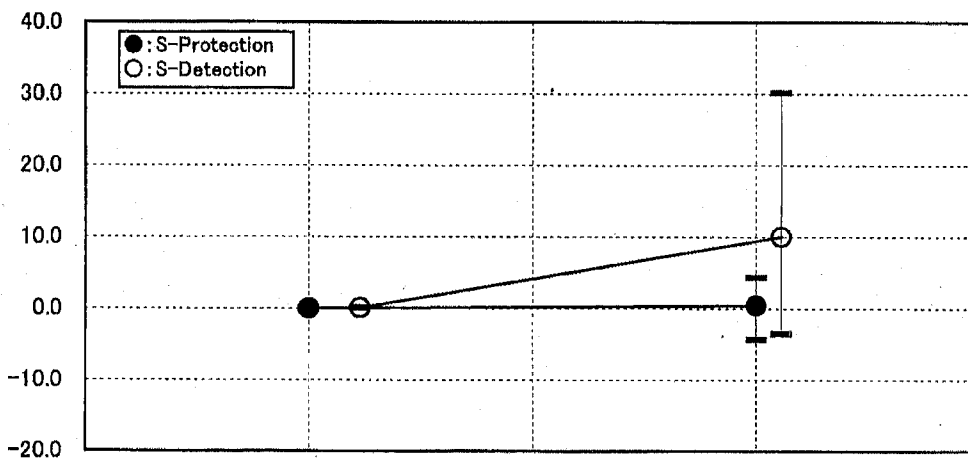


Step →	Initial Measured value	Damp heat
Max	24.6	2.9
Min	17.5	-3.0
Avg	20.13	0.53
$\sigma_{n-1}$	1.45	1.03

Group D  
Contact resistance  
SW contact

Requirements:  
Check.

Unit[mΩ]

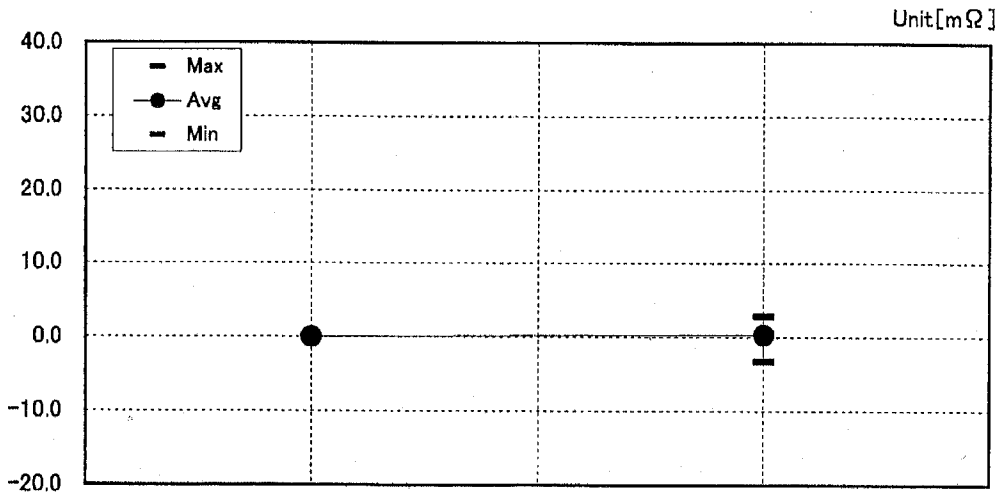


Step →	Initial Measured value	Damp heat
●: Max	46.2	4.4
●: Min	35.9	-4.3
●: Avg	41.56	0.48
●: $\sigma_{n-1}$	3.80	3.54
○: Max	84.9	29.1
○: Min	42.1	-3.5
○: Avg	58.50	9.62
○: $\sigma_{n-1}$	17.15	12.08

Group F  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

TR609E-1501

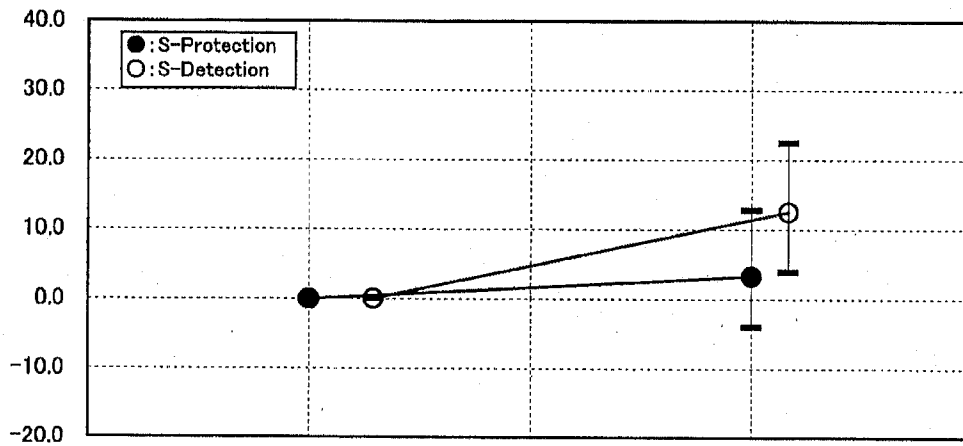


Step →	Initial Measured value	Thermal shock
Max	28.9	2.8
Min	17.7	-3.3
Avg	20.76	0.31
$\sigma_{n-1}$	2.00	1.04

Group F  
Contact resistance  
SW contact

Requirements:  
Check.

Unit[mΩ]

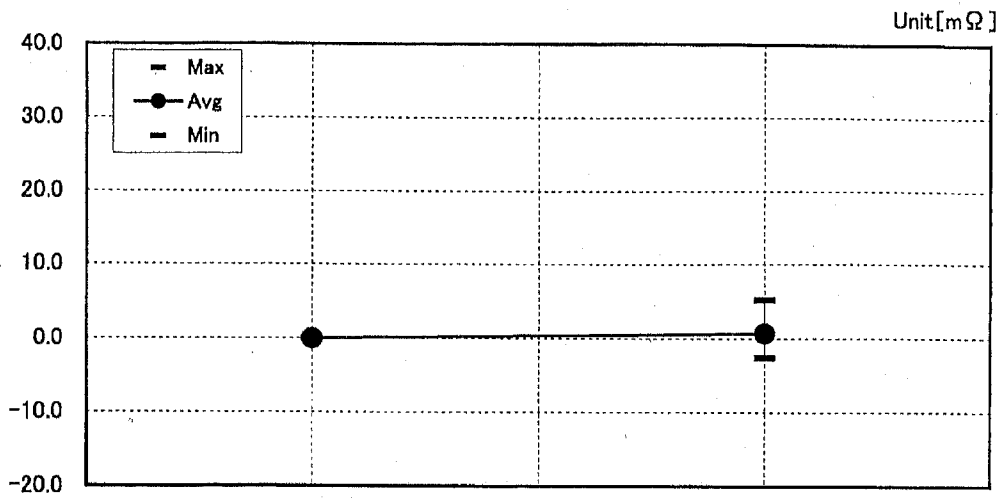


Step →	Initial Measured value	Thermal shock
●: Max	54.1	12.8
Min	38.6	-4.0
Avg	47.76	3.32
$\sigma_{n-1}$	6.19	6.93
○: Max	61.5	21.0
Min	45.1	3.7
Avg	53.86	11.68
$\sigma_{n-1}$	6.98	6.83

Group G  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

TR609E-1501

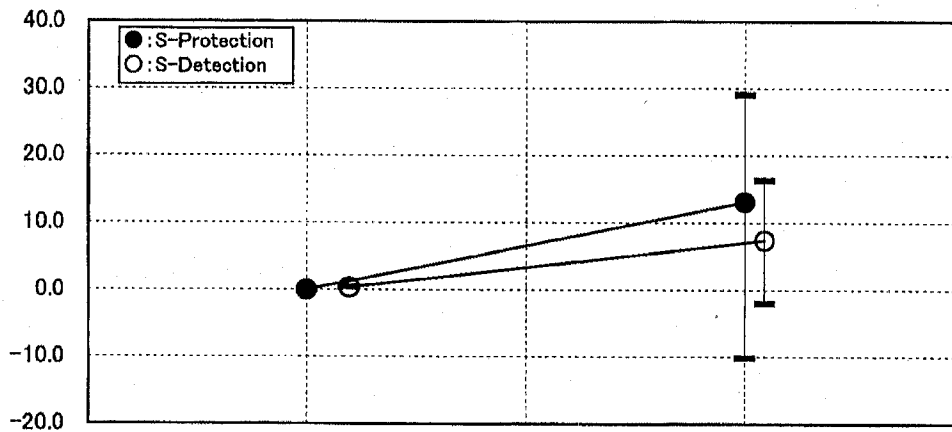


Step →	Initial Measured value	Corrosion, H <sub>2</sub> S gas
Max	24.8	5.2
Min	17.6	-2.6
Avg	20.33	0.74
$\sigma_{n-1}$	1.55	1.40

Group G  
Contact resistance  
SW contact

Requirements:  
Check.

Unit [mΩ]



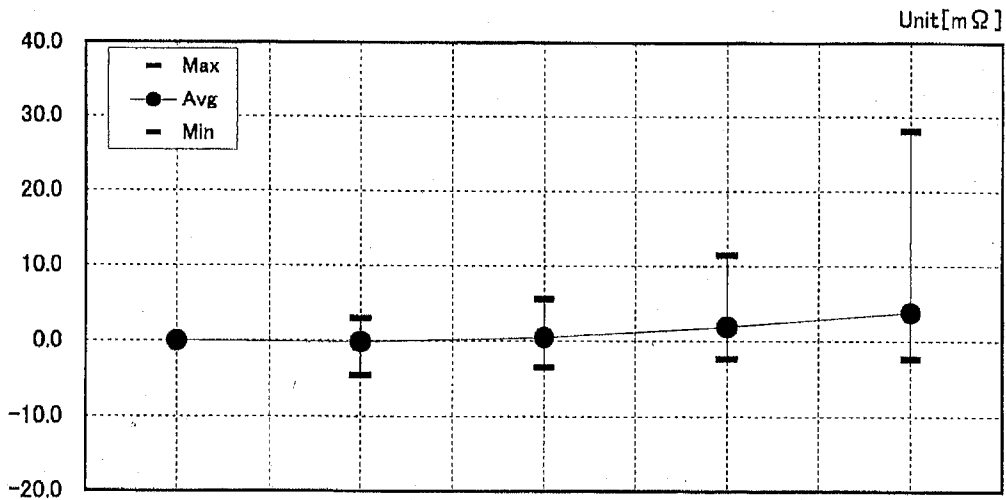
Step →	Initial Measured value	Corrosion, H <sub>2</sub> S gas
●: Max	57.4	29.1
Min	35.8	-10.2
Avg	50.24	13.12
$\sigma_{n-1}$	8.48	14.84
○: Max	97.6	14.6
Min	56.3	-2.2
Avg	75.06	6.44
$\sigma_{n-1}$	18.17	6.89



Group H  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

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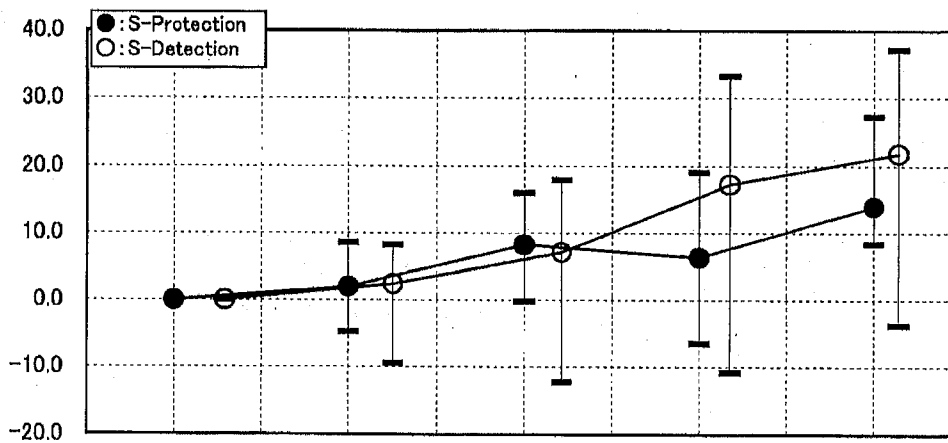


Step →	Initial Measured value	Mechanical operation	Dry heat	Damp heat	Damp heat, cyclic
Max	24.6	2.9	5.5	11.4	28.0
Min	17.6	-4.60	-3.50	-2.40	-2.4
Avg	20.80	-0.18	0.45	1.85	3.74
$\sigma_{n-1}$	1.73	1.46	1.87	2.93	5.31

Group H  
Contact resistance  
SW contact

Requirements:  
Check.

Unit[mΩ]



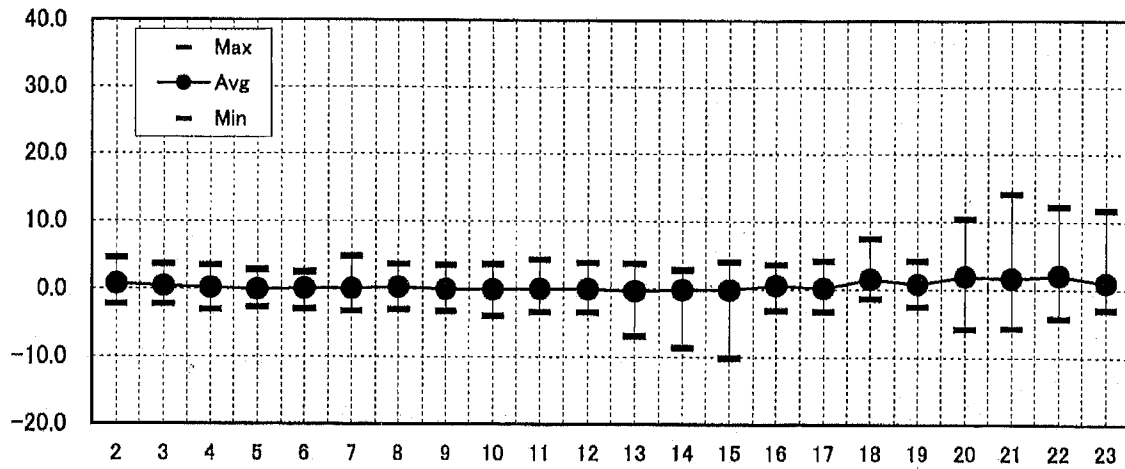
Step →	Initial Measured value	Mechanical operation	Dry heat	Damp heat	Damp heat, cyclic	
●	Max	52.9	8.5	16.0	19.1	27.3
	Min	37.9	-4.80	-0.20	-6.60	8.40
	Avg	44.78	2.0	8.2	6.4	14.0
	$\sigma_{n-1}$	5.89	5.48	6.48	9.74	7.99
○	Max	71.1	7.3	15.9	29.5	33.0
	Min	57.0	-8.4	-10.9	-9.6	-3.4
	Avg	64.84	2.1	6.3	15.4	19.4
	$\sigma_{n-1}$	6.57	6.3	10.6	17.0	15.6

Group I  
Contact resistance  
SF contact

Requirements:  
Check.

TR609E-1501

Unit[mΩ]

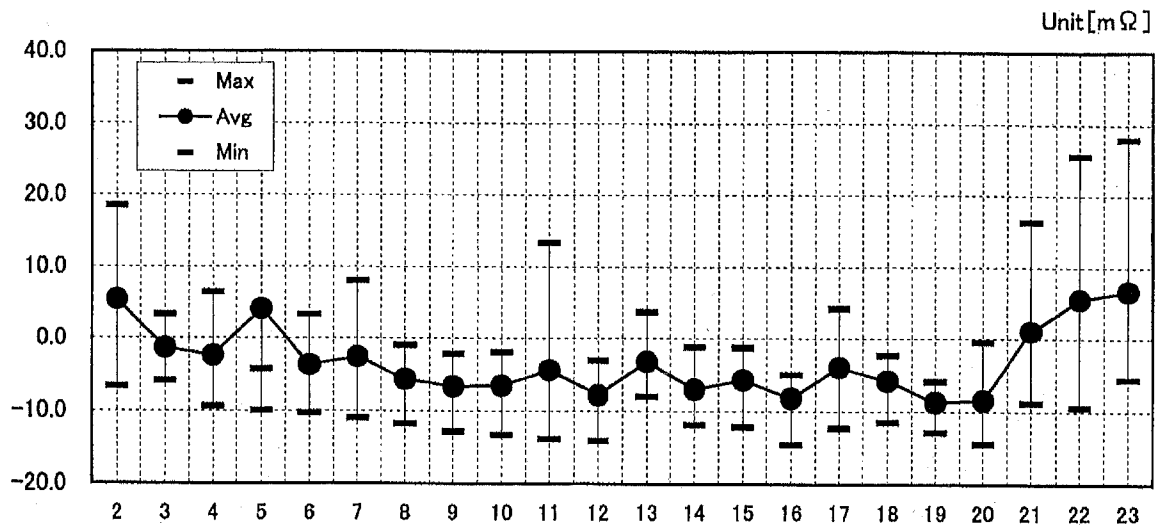


Step →	Mechanical operation	Max	Min	Avg	$\sigma_{n-1}$
1	Initial	20.5	13.7	16.71	1.56
2	50	4.5	-2.30	0.80	1.58
3	100	3.6	-2.30	0.46	1.45
4	200	3.5	-3.10	0.26	1.46
5	300	2.8	-2.70	-0.04	1.36
6	400	2.5	-3.00	0.09	1.27
7	500	4.8	-3.30	0.04	1.48
8	600	3.6	-3.10	0.30	1.33
9	700	3.5	-3.30	0.02	1.43
10	800	3.6	-4.00	-0.04	1.59
11	900	4.3	-3.40	0.06	1.46
12	1000	3.8	-3.50	0.00	1.56
13	1500	3.7	-7.00	-0.24	2.15
14	2000	2.8	-8.70	-0.07	1.98
15	2500	4.0	-10.20	-0.07	2.75
16	3000	3.6	-3.20	0.60	1.54
17	4000	4.2	-3.30	0.19	1.46
18	5000	7.5	-1.40	1.52	1.71
19	6000	4.2	-2.60	0.82	1.51
20	7000	10.4	-5.90	1.94	2.94
21	8000	14.1	-5.80	1.63	3.32
22	9000	12.2	-4.3	2.10	3.22
23	10000	11.7	-3.0	1.02	2.31

Group I  
 Contact resistance  
 SW contact (S-Protection)

Requirements:  
 Check.

TR609E-1501



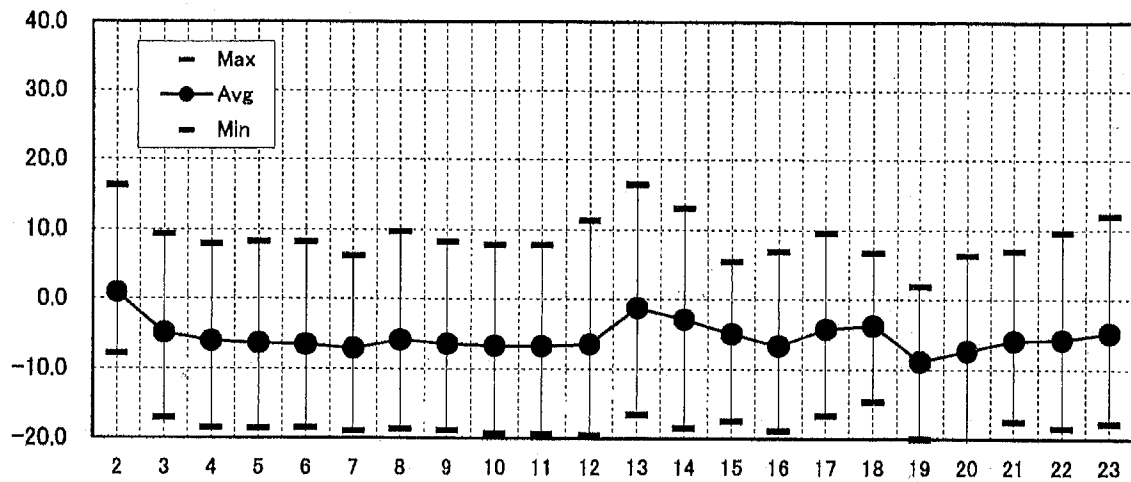
Step →	Mechanical operation	Max	Min	Avg	$\sigma_{n-1}$
1	Initial	68.6	47.0	56.44	8.06
2	50	18.4	-6.7	5.40	9.09
3	100	3.3	-5.9	-1.32	4.20
4	200	6.4	-9.4	-2.42	6.39
5	300	-10.0	-4.3	4.10	9.52
6	400	3.3	-10.3	-3.68	5.26
7	500	8.0	-11.0	-2.60	6.96
8	600	-1.0	-11.8	-5.68	4.53
9	700	-2.2	-12.9	-6.68	4.21
10	800	-1.9	-13.3	-6.56	4.73
11	900	13.3	-13.9	-4.42	10.54
12	1000	-3.1	-14.1	-7.84	4.37
13	1500	3.7	-8.0	-3.24	4.37
14	2000	-1.2	-11.9	-7.02	4.08
15	2500	-1.3	-12.2	-5.70	4.14
16	3000	-5.0	-14.6	-8.18	3.89
17	4000	4.2	-12.3	-3.92	5.92
18	5000	-2.3	-11.5	-5.78	3.42
19	6000	-5.9	-12.9	-8.68	2.71
20	7000	-0.5	-14.5	-8.42	5.17
21	8000	16.3	-8.8	1.10	10.38
22	9000	25.6	-9.4	5.56	13.41
23	10000	27.9	-5.6	6.68	13.17

Group I  
Contact resistance  
SW contact (S-Detection)

Requirements:  
Check.

TR609E-1501

Unit[mΩ]

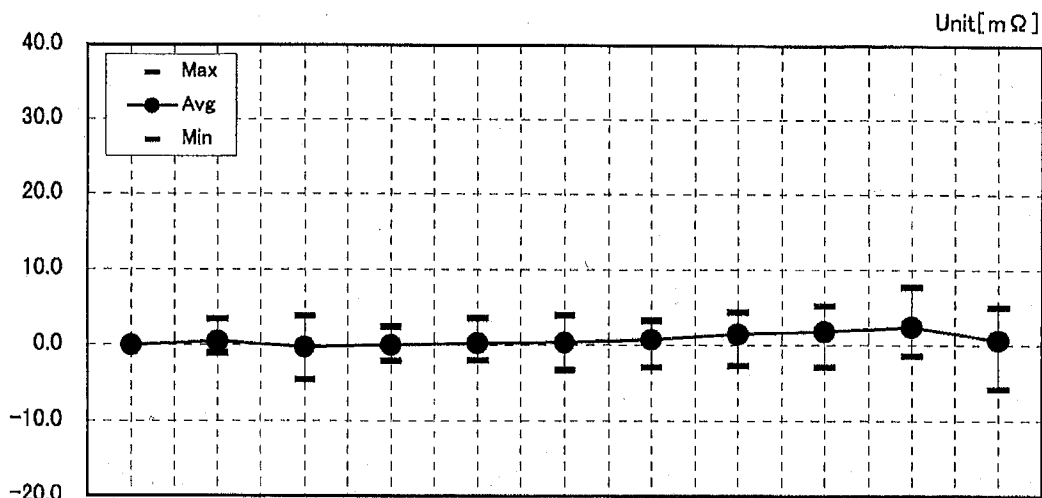


Step →	Mechanical operation	Max	Min	Avg	$\sigma_{n-1}$
1	Initial	73.1	53.8	61.20	7.21
2	50	16.2	-7.9	0.94	9.79
3	100	9.3	-17.1	-4.92	9.44
4	200	7.9	-18.5	-6.10	9.46
5	300	8.2	-18.6	-6.40	9.65
6	400	8.2	-18.5	-6.58	9.66
7	500	6.2	-19.0	-7.14	9.10
8	600	9.7	-18.7	-5.92	10.31
9	700	8.2	-18.9	-6.50	9.89
10	800	7.8	-19.3	-6.74	9.83
11	900	7.8	-19.4	-6.78	9.85
12	1000	11.3	-19.6	-6.52	11.31
13	1500	16.4	-16.6	-1.24	11.77
14	2000	13.1	-18.5	-2.92	11.30
15	2500	5.4	-17.5	-5.02	8.43
16	3000	6.8	-18.9	-6.70	9.21
17	4000	9.5	-16.7	-4.32	9.80
18	5000	6.7	-14.7	-3.82	8.23
19	6000	1.9	-20.0	-8.90	7.76
20	7000	6.3	-20.4	-7.38	9.45
21	8000	6.9	-17.5	-5.94	8.68
22	9000	9.6	-18.5	-5.84	10.15
23	10000	12.0	-17.8	-4.86	10.82

Group J  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

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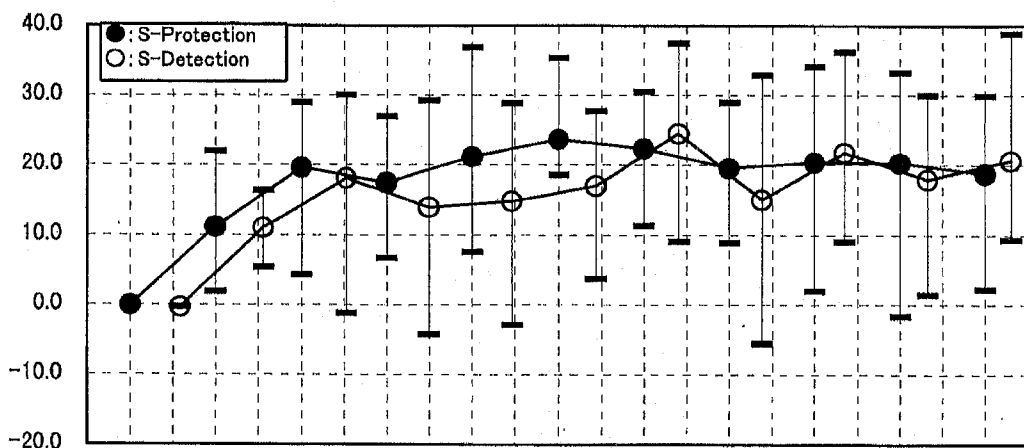


cycles →	Initial Measured value	Damp heat, cyclic									
		1	2	3	4	5	6	7	8	9	10
Max	24.6	3.4	3.8	2.4	3.5	3.9	3.2	4.3	5.2	7.7	5.0
Min	17.2	-1.1	-4.6	-2.1	-2.0	-3.3	-2.9	-2.7	-2.9	-1.4	-5.8
Avg	20.34	0.53	-0.24	0.02	0.29	0.38	0.75	1.50	1.82	2.42	0.70
$\sigma_{n-1}$	1.80	1.01	1.41	0.99	1.16	1.38	1.33	1.43	1.67	2.05	1.90

Group J  
Contact resistance  
SW contact

Requirements:  
Check.

Unit[mΩ]

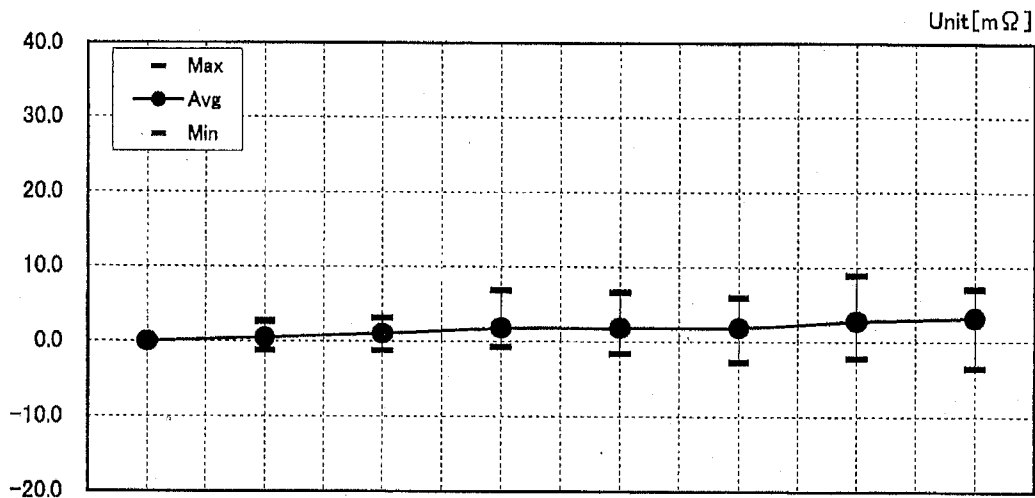


cycles →	Initial Measured value	Damp heat, cyclic										
		1	2	3	4	5	6	7	8	9	10	
●	Max	66.6	22.0	29.0	27.0	36.9	35.3	30.5	29.0	34.1	33.3	29.9
	Min	37.1	1.9	4.3	6.7	7.6	18.6	11.4	8.9	2.0	-1.6	2.3
	Avg	49.58	11.22	19.68	17.50	21.22	23.76	22.42	19.56	20.40	20.30	18.82
	$\sigma_{n-1}$	11.09	8.93	9.36	7.36	10.67	6.98	6.97	7.44	11.67	13.60	11.66
○	Max	70.1	15.5	28.1	27.4	27.0	26.0	35.0	30.7	33.8	28.1	36.3
	Min	59.3	5.3	-0.8	-3.6	-2.4	3.8	8.7	-4.8	8.7	1.7	9.0
	Avg	64.50	10.58	17.08	13.28	14.10	16.10	23.04	14.30	20.46	16.94	19.44
	$\sigma_{n-1}$	4.73	4.12	11.56	13.36	13.06	11.01	10.14	13.73	9.32	11.31	10.23

Group K  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

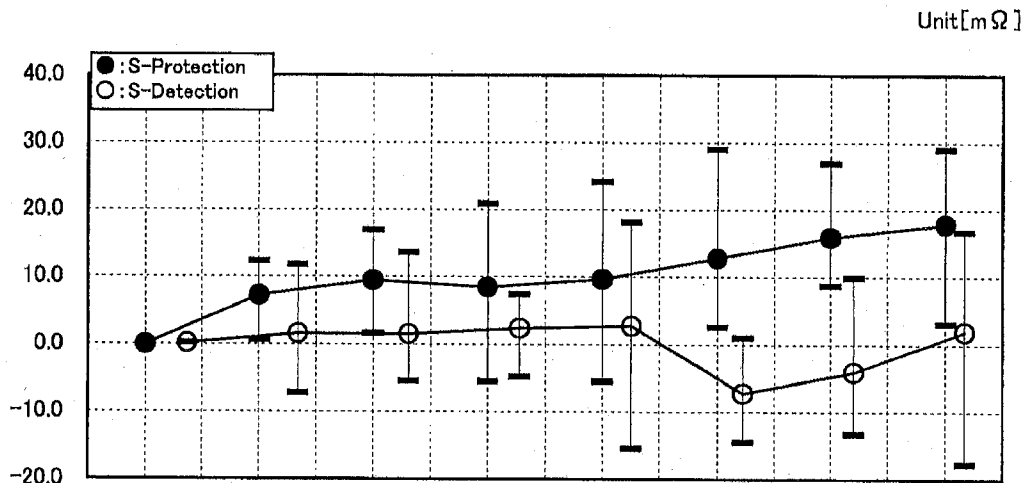
TR609E-1501



Step →	Initial Measured value	Harsh environmental [step]						
		A	B	C	D	E	F	G
Max	26.4	2.7	3.1	6.8	6.6	5.9	8.9	7.0
Min	17.7	-1.3	-1.3	-0.8	-1.7	-2.8	-2.3	-3.6
Avg	20.43	0.51	1.07	1.79	1.85	1.89	2.81	3.17
$\sigma_{n-1}$	1.84	0.84	1.00	1.92	1.94	2.18	2.48	2.14

Group K  
Contact resistance  
SW contact

Requirements:  
Check.



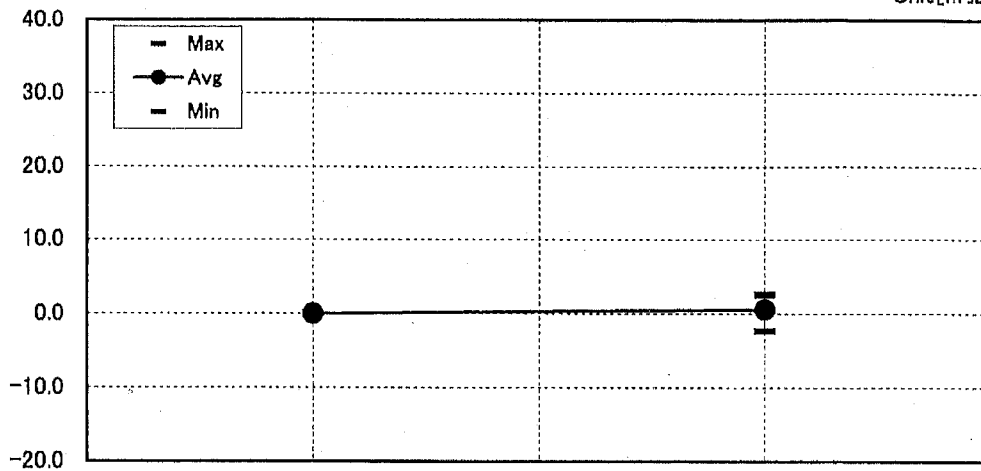
Step →	Initial Measured value	Harsh environmental [step]							
		A	B	C	D	E	F	G	
●	Max	56.5	12.3	17.0	20.9	24.2	29.0	27.0	29.0
	Min	39.5	0.6	1.6	-5.5	-5.5	2.6	8.7	3.1
	Avg	51.28	7.20	9.48	8.44	9.66	12.80	15.96	17.90
	$\sigma_{n-1}$	6.72	4.86	6.04	10.18	10.88	10.85	6.74	9.72
○	Max	82.2	10.5	12.2	6.5	16.3	0.8	8.8	15.0
	Min	54.8	-6.7	-5.1	-4.5	-14.2	-13.3	-12.2	-16.2
	Avg	68.00	1.28	1.22	2.00	2.34	-6.68	-3.82	1.60
	$\sigma_{n-1}$	11.56	6.35	6.74	4.36	12.44	5.06	8.65	12.29

Group L  
Contact resistance  
SF contact

Requirements:  
Initial: 100 mΩ or less.  
After test: No rise of 40 mΩ or more from initial value.

TR609E-1501

Unit[mΩ]

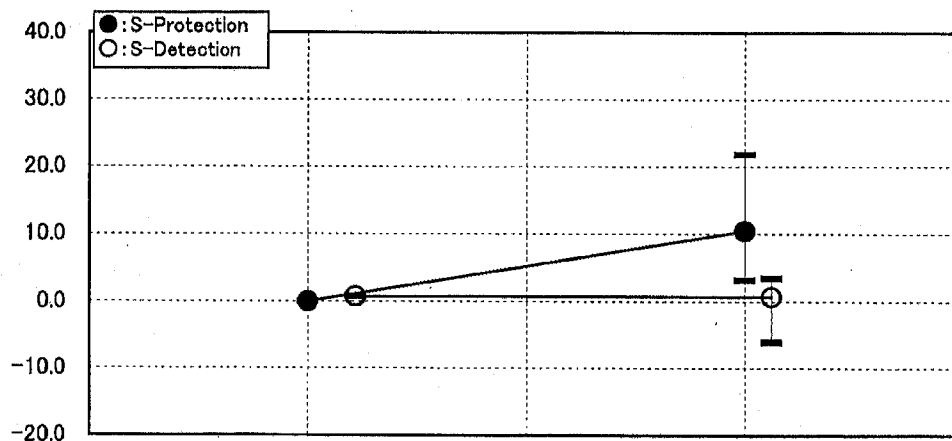


Step →	Initial Measured value	Vibration (Condition 2)
Max	24.7	2.6
Min	17.6	-2.3
Avg	20.47	0.60
$\sigma_{n-1}$	1.48	1.13

Group L  
Contact resistance  
SW contact

Requirements:  
Check.

Unit[mΩ]



Step →	Initial Measured value	Vibration (Condition 2)
●: Max	69.3	21.8
Min	44.3	3.20
Avg	52.32	10.46
$\sigma_{n-1}$	9.83	8.75
○: Max	82.0	2.6
Min	57.0	-6.5
Avg	70.60	-0.04
$\sigma_{n-1}$	10.89	3.71

**Insulation resistance****Requirements:**

Initial: 1000 MΩ or more

After test: 100 MΩ or more

**Group B**Unit: x 10<sup>4</sup> MΩ

		Initial	Cold
(1) Between adjacent contact	Max	100	100
	Min	100	100
(2) Between SW - A	Max	100	100
	Min	100	100
(2) Between SW - B	Max	100	100
	Min	100	100
(2) Between SW - C	Max	100	100
	Min	100	100
(3) SF-Protection	Max	100	100
	Min	100	100
(4) SF-Detection	Max	100	100
	Min	100	100
(5) SF-S	Max	100	100
	Min	100	100
(6) No. 9 - cover	Max	100	100
	Min	100	100

**Group C**Unit: x 10<sup>4</sup> MΩ

		Initial	Dry heat
(1) Between adjacent contact	Max	100	100
	Min	100	100
(2) Between SW - A	Max	100	100
	Min	100	100
(2) Between SW - B	Max	100	100
	Min	100	100
(2) Between SW - C	Max	100	100
	Min	100	100
(3) SF-Protection	Max	100	100
	Min	100	100
(4) SF-Detection	Max	100	100
	Min	100	100
(5) SF-S	Max	100	100
	Min	100	100
(6) No. 9 - cover	Max	100	100
	Min	100	100



**Insulation resistance****Requirements:**

Initial: 1000 MΩ or more

After test: 100 MΩ or more

**Group D**Unit: x 10<sup>4</sup> MΩ

		Initial	Damp heat
(1) Between adjacent contact	Max	100	100
	Min	100	100
(2) Between SW - A	Max	100	100
	Min	100	100
(2) Between SW - B	Max	100	100
	Min	100	100
(2) Between SW - C	Max	100	100
	Min	100	100
(3) SF-Protection	Max	100	100
	Min	100	100
(4) SF-Detection	Max	100	100
	Min	100	100
(5) SF-S	Max	100	100
	Min	100	100
(6) No. 9 - cover	Max	100	100
	Min	100	100

**Group F**Unit: x 10<sup>4</sup> MΩ

		Initial	Thermal shock
(1) Between adjacent contact	Max	100	100
	Min	100	100
(2) Between SW - A	Max	100	100
	Min	100	100
(2) Between SW - B	Max	100	100
	Min	100	100
(2) Between SW - C	Max	100	100
	Min	100	100
(3) SF-Protection	Max	100	100
	Min	100	100
(4) SF-Detection	Max	100	100
	Min	100	100
(5) SF-S	Max	100	100
	Min	100	100
(6) No. 9 - cover	Max	100	100
	Min	100	100

## Insulation resistance

### Requirements:

Initial: 1000 MΩ or more

After test: 100 MΩ or more

### Group G

Unit: x 10<sup>4</sup> MΩ

		Initial	Corrosion, H <sub>2</sub> S gas
(1) Between adjacent contact	Max	100	100
	Min	100	100
(2) Between SW - A	Max	100	100
	Min	100	100
(2) Between SW - B	Max	100	100
	Min	100	100
(2) Between SW - C	Max	100	100
	Min	100	100
(3) SF-Protection	Max	100	100
	Min	100	100
(4) SF-Detection	Max	100	100
	Min	100	100
(5) SF-S	Max	100	100
	Min	100	100
(6) No. 9 - cover	Max	100	100
	Min	100	100

### Group H

Unit: x 10<sup>4</sup> MΩ

		Initial	Contact creep		
			Dry heat	Damp heat	Damp heat, cyclic
(1) Between adjacent contact	Max	100	100	100	100
	Min	100	100	100	100
(2) Between SW - A	Max	100	100	100	100
	Min	100	100	100	100
(2) Between SW - B	Max	100	100	100	100
	Min	100	100	100	100
(2) Between SW - C	Max	100	100	100	100
	Min	100	100	100	100
(3) SF-Protection	Max	100	100	100	100
	Min	100	100	100	100
(4) SF-Detection	Max	100	100	100	100
	Min	100	100	100	100
(5) SF-S	Max	100	100	100	100
	Min	100	100	100	100
(6) No. 9 - cover	Max	100	100	100	100
	Min	100	100	100	100

## Insulation resistance

## Requirements:

Initial: 1000 MΩ or more

After test: 100 MΩ or more

## Group J

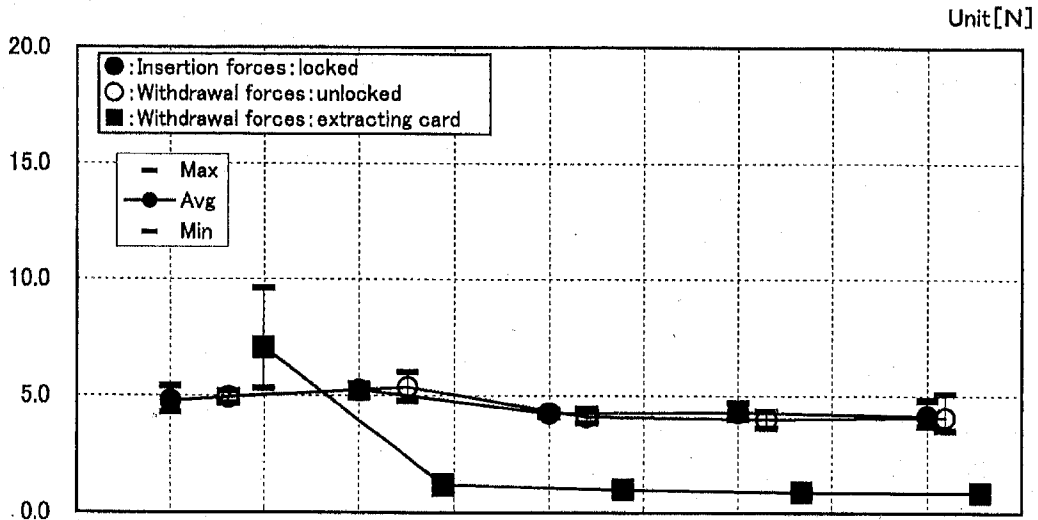
Unit: x 10<sup>4</sup> MΩ

		Initial	Damp heat, cyclic (cycle)									
			1	2	3	4	5	6	7	8	9	10
(1) Between adjacent contact	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100
(2) Between SW - A	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100
(2) Between SW - B	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100
(2) Between SW - C	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100
(3) SF-Protection	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100
(4) SF-Detection	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100
(5) SF-S	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100
(6) No. 9 - cover	Max	100	100	100	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100	100	100	100

## Group K

Unit: x 10<sup>4</sup> MΩ

		Initial	Harsh environmental (step)						
			A	B	C	D	E	F	G
(1) Between adjacent contact	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100
(2) Between SW - A	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100
(2) Between SW - B	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100
(2) Between SW - C	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100
(3) SF-Protection	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100
(4) SF-Detection	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100
(5) SF-S	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100
(6) No. 9 - cover	Max	100	100	100	100	100	100	100	100
	Min	100	100	100	100	100	100	100	100



Step →	Mechanical operation				
	Initial	100 times	1000 times	5000 times	10000 times
●: Max	5.4	5.5	4.4	4.7	4.8
Min	4.3	4.90	4.10	4.00	3.70
Avg	4.78	5.2	4.3	4.3	4.1
$\sigma_{n-1}$	0.45	0.26	0.15	0.25	0.40
○: Max	5.3	6.1	4.6	4.5	5.2
Min	4.8	4.9	4.0	3.8	3.7
Avg	5.06	5.5	4.3	4.2	4.2
$\sigma_{n-1}$	0.18	0.4	0.2	0.3	0.6
■: Max	9.0	1.2	0.9	0.8	0.8
Min	4.9	0.6	0.5	0.5	0.5
Avg	6.58	0.96	0.76	0.66	0.64
$\sigma_{n-1}$	1.55	0.25	0.19	0.11	0.11

## **1 Appearance, Construction**

### **1.1 Requirements**

**Appearance, Construction:** No defect such as breakage or crack on the component.

**Intermateability:** No defect in mating.

### **1.2 Test method**

**Appearance, Construction:** Inspected visually with a magnifying glass to see if there was no defect such as breakage or crack on the component.

**Intermateability:** Inspected to see if there was no defect when specimens were mated with the applicable card.

### **1.3 Test results**

**Appearance, Construction:** No defect.

**Intermateability:** No defect.

## 2 Contact resistance

### 2.1 Requirements

SF Contact: 100 mΩ or less.

SW Contact: Check.

### 2.2 Test method

Contact resistance was measured according to the conditions specified below:

Open circuit voltage: 20 mV a.c. or less, 1 kHz

Test current: 1 mA a.c.

Measuring method: Measured by milliohm-meter at the points shown in the following figure.

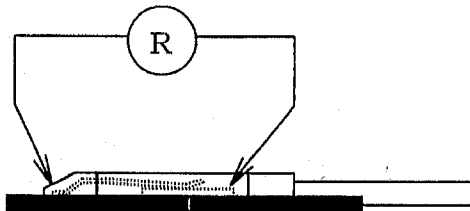


Figure: Skeleton figure of measuring method

\* SW contact are recorded as the value deducted the following board bulk resistance:

SW-S contact - SW-P contact (switch for write protection) 20.7 mΩ

SW-S contact - SW-P contact (switch for card detection) 42.5 mΩ

### 2.3 Test equipment

Test equipment	Model	Manufacturer
Milliohm-meter	2420	NF Electrical Instruments

### 2.4 Test results

Groups A to D, F to L

Initial

Unit: mΩ

	SF contact	SW contact	
Max	28.9	69.3	97.6
Min	13.7	35.8	41.2
Avg	20.04	48.91	62.49
$\sigma_{n-1}$	1.93	8.12	11.82

See pages 6 to 18 for graphs and result data.

### 3 Insulation resistance

#### 3.1 Requirements

1000 MΩ or more.

#### 3.2 Test method

Insulation resistance was measured according to the conditions specified below:

Test voltage: 500 V d.c.

Duration: 1 min ± 5 s

If the results were verified as the required value or more during the testing, the measurement can be terminated.

Measuring point: (1) Between adjacent contacts, (2) Between SW contacts, (3) Between SF contact and SW-P (write protection), (4) Between SF contact and SW-P (detection), (5) Between SF contact and SW-S, (6) Between contact No. 9 and metal cover (see figure below)

Mated/Unmated: Unmated

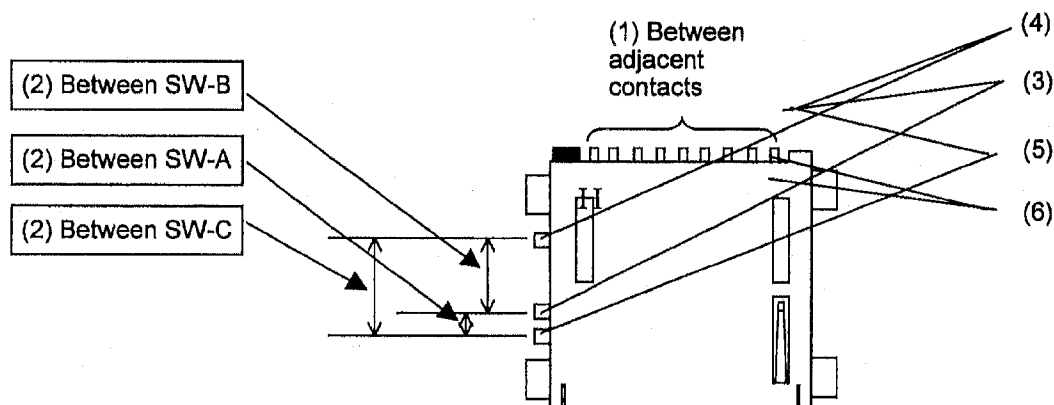


Figure: Skeleton figure of measuring method

#### 3.3 Test equipment

Test equipment	Model	Manufacturer
Super Megohm-meter	SM-8210	Toa Electronics

## 3.4 Test results

Groups B to D, F to H, J and K

Initial

Unit:  $\times 10^4 M\Omega$ 

	(1) Between adjacent contact	(2) Between SW - A	(2) Between SW - B	(2) Between SW - C	(3) SF - Protection	(4) SF - Detection	(5) SF-S	(6) No. 9 - cover
Max	100	100	100	100	100	100	100	100
Min	100	100	100	100	100	100	100	100

See pages 19 to 22 for result data.



## 4 Voltage proof

### 4.1 Requirements

No defect such as dielectric breakdown or flashover.

### 4.2 Test method

Voltage proof was confirmed according to the conditions specified below:

Test voltage: 500 V a.c.

Duration: 1 min  $\pm$  5 s

Imposing method: Test voltage was raised in the rate of 500 V/s until it reaches the required test voltage.

Leak current: Judged dielectric breakdown at 2 mA

Measuring point: (1) Between adjacent contacts, (2) Between SW contacts, (3) Between SF contact and SW-P (write protection), (4) Between SF contact and SW-P (detection), (5) Between SF contact and SW-S, (6) Between contact No. 9 and metal cover (see figure below)

Mated/Unmated: Unmated

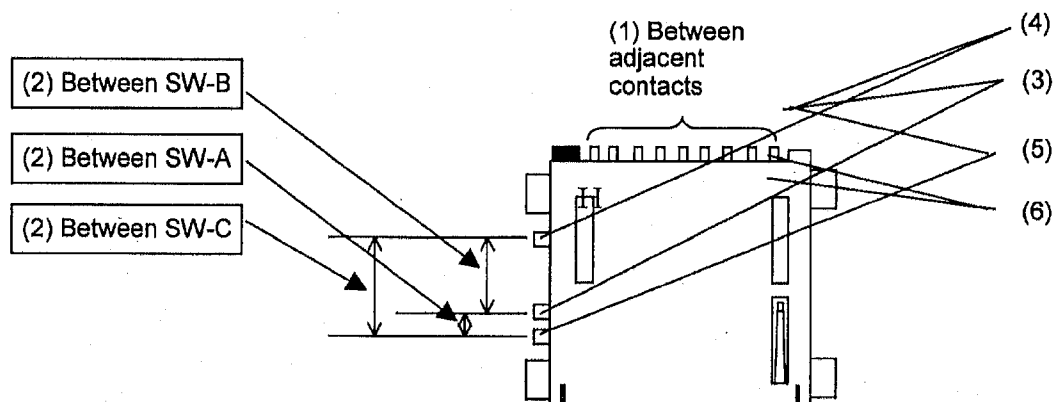


Figure: Skeleton figure of measuring method

### 4.3 Test equipment

Test equipment	Model	Manufacturer
Voltage proof tester	TOS8750	Kikusui Electronics

**4.4 Test results**

(1) Between adjacent contacts	No defect.
(2) Between SW contacts-A	No defect.
(2) Between SW contacts-B	No defect.
(2) Between SW contacts-C	No defect.
(3) SF - Protection	No defect.
(4) SF - Detection	No defect.
(5) SF - S	No defect.
(6) No. 9 - cover	No defect.

## 5 Insertion and withdrawal forces

### 5.1 Requirements

Check.

### 5.2 Test method

The test was conducted manually according to the conditions specified below:

Repeated speed: 25 mm/min

Repeated frequency: 1

Insertion force:

Locking the card: The force required to mate the card with the connector and lock it.

Withdrawal force:

Unlocking the card: The force required to push the card in to withdraw it.

Withdrawing the card: The force required to withdraw the card

### 5.3 Test equipment

Test equipment	Model	Manufacturer
Insertion and withdrawal forces tester	1840	Aikoh Engineering

### 5.4 Test results

See page 23 for graph and result data.

## 6 Vibration

### 6.1 Requirements

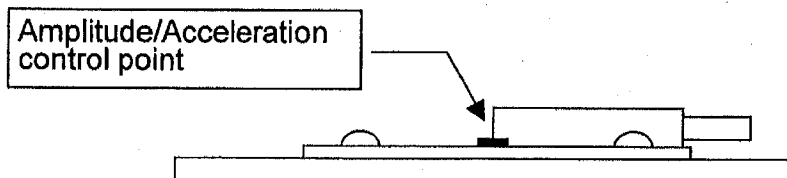
- Appearance, Construction: No defect such as breakage or crack on the component.
- Electrical discontinuity: No electrical discontinuity of 100 ns or more.
- Contact resistance:
- SF contact: No rise of 40 mΩ or more from initial value.
  - SW contact: Check.

### 6.2 Test method

The test was conducted according to the conditions specified below:

- Frequency range: 10 Hz to 2000 Hz
- Single amplitude: 20 m/s<sup>2</sup>
- Time for one cycle: 10 Hz to 2000 Hz to 10 Hz, approx. 5 min
- Number of cycles to be swept: 3 axial directions, 10 cycles each, 30 cycles in total
- Connection method: Series connection for all contacts
- Test voltage: 5 V d.c.
- Test current: 100 mA d.c.

Note: [Electrical discontinuity] was checked continuously during the test.



**Figure: Skeleton sketch of specimens fixing method**

### 6.3 Test equipment

Test equipment	Model	Manufacturer
Vibration machine	F-300BM/A-E78	Emic
Digital oscilloscope	9360S	Lecroy
Variable constant dc volt and ampere generator	PAC35-3	Kikusui Electronics

### 6.4 Test results

- Appearance, Construction: No defect.
- Electrical discontinuity: No electrical discontinuity.
- Contact resistance: See page 6 for graphs and result data.

## 7 Shock

### 7.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Electrical discontinuity: No electrical discontinuity of 100 ns or more.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

### 7.2 Test method

The test was conducted according to the conditions specified below:

Acceleration: 490 m/s<sup>2</sup>

Duration: 11 ms

Wave form: Half-sine wave

Number of shocks: 3 both axial directions, 3 times each, 18 times in total

Connection method: Series connection for all contacts (incl. SW contact)

Test voltage: 5 V d.c.

Test current: 100 mA d.c.

Note: [Electrical discontinuity] was checked during the test.

### 7.3 Test equipment

Test equipment	Model	Manufacturer
Shock testing machine	PEP-250MR	Itoh Seiki
Digital oscilloscope	9360S	Lecroy
Variable constant dc volt and ampere generator	PAC35-3	Kikusui Electronics

### 7.4 Test results

Appearance, Construction: No defect.

Electrical discontinuity: No electrical discontinuity.

Contact resistance: See page 6 for graph and result data.

## 8 Cold

### 8.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

Insulation resistance: 100 MΩ or more.

### 8.2 Test method

The test was conducted according to the conditions specified below:

Temperature: -55 °C

Duration: 96 h

Mated/Unmated: Mated

Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.

### 8.3 Test equipment

Test equipment	Model	Manufacturer
Constant low temperature chamber	MC-71	Espec

### 8.4 Test results

Appearance, Construction: No defect.

Contact resistance: See page 7 for graphs and result data.

Insulation resistance: See page 19 for result data.

## 9 Dry heat

### 9.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

Insulation resistance: 100 MΩ or more.

### 9.2 Test method

The test was conducted according to the conditions specified below:

Temperature: 85 °C

Duration: 96 h

Mated/Unmated: Mated

Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.

### 9.3 Test equipment

Test equipment	Model	Manufacturer
Constant high temperature chamber	PVH-220	Espec

### 9.4 Test results

Appearance, Construction: No defect.

Contact resistance: See page 8 for graphs and result data.

Insulation resistance: See page 19 for result data.

## 10 Damp heat

### 10.1 Requirements

Appearance, Construction: No defect such as breakage, crack or corrosion which impairs the function of the component.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

Insulation resistance: 1000 MΩ or more.

Voltage proof: No defect such as dielectric breakdown or flashover.

### 10.2 Test method

The test was conducted according to the conditions specified below:

Temperature: 40 °C

Humidity: 90 %RH to 95 %RH

Duration: 96 h

Mated/Unmated: Mated

Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.

### 10.3 Test equipment

Test equipment	Model	Manufacturer
Constant temperature and humidity chamber	LH-112	Espec

### 10.4 Test results

Appearance, Construction: No defect.

Contact resistance: See page 9 for graphs and result data.

Insulation resistance: See page 20 for result data.

Voltage proof:

(1) Between adjacent contacts	No defect.
(2) Between SW contacts-A	No defect.
(2) Between SW contacts-B	No defect.
(2) Between SW contacts-C	No defect.
(3) SF - Protection	No defect.
(4) SF - Detection	No defect.
(5) SF - S	No defect.
(6) No. 9 - cover	No defect.



## 11 Corrosion, salt mist

### 11.1 Requirements

Appearance, Construction: No defect such as corrosion which impairs the function of the connector.

### 11.2 Test method

The test was conducted according to the conditions specified below:

Concentration: 5 %

Temperature: 35 °C

Duration: 48 h

Mated/Unmated: Mated

Recovery: After the specimens were left at ambient temperature and humidity for 1 hour, rinsed with water and left at ambient temperature (15 °C to 35 °C) for 24 hours.

### 11.3 Test equipment

Test equipment	Model	Manufacturer
CASS tester	CASSER-ISO-3	Suga Test Instrument

### 11.4 Test results

Appearance, Construction: No defect.

## 12 Thermal shock

### 12.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

Insulation resistance: 1000 MΩ or more.

### 12.2 Test method

The test was conducted according to the conditions specified below:

Step	1	2	3	4
Temperature (°C)	-55	15 to 35	85	15 to 35
Duration (min)	30	2 to 3	30	2 to 3

Number of cycles: 5 cycles, subject to one(1) cycle as the above condition.

Mated/Unmated: Mated

Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.

### 12.3 Test equipment

Test equipment	Model	Manufacturer
Thermal shock test chamber	TSV-40S	Espec

### 12.4 Test results

Appearance, Construction: No defect.

Contact resistance: See page 10 for graphs and result data.

Insulation resistance: See page 20 for result data.

## 13 Corrosion, H<sub>2</sub>S gas

### 13.1 Requirements

Appearance, Construction: No defect such as corrosion which impairs the function of the connector.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

Insulation resistance: 1000 MΩ or more.

### 13.2 Test method

The test was conducted according to the conditions specified below:

Concentration: 3 ppm

Temperature: 40 °C

Humidity: 80 %RH

Duration: 96 h

Mated/Unmated: Mated

Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.

### 13.3 Test equipment

Test equipment	Model	Manufacturer
Gas corrosion tester	KG120C4S	K.S. Electric Parts Institute

### 13.4 Test results

Appearance, Construction: No defect.

Contact resistance: See page 11 for graphs and result data.

Insulation resistance: See page 21 for result data.

## 14 Contact creep

### 14.1 Requirements

Appearance, Construction: No defect such as remarkable abrasion, breakage or crack on the component.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

Insulation resistance: 1000 MΩ or more.

### 14.2 Test method

- (1) 10 times of insertions and withdrawals were conducted at the speed of 600 times/h or less.
  - (2) The test was conducted under the conditions shown in Table 1 below.
  - (3) The test was conducted under the conditions shown in Table 2 below.
  - (4) The test was conducted under the conditions shown in Table 3 below.
- (Applicable standard: JIS C 5402 7.4)

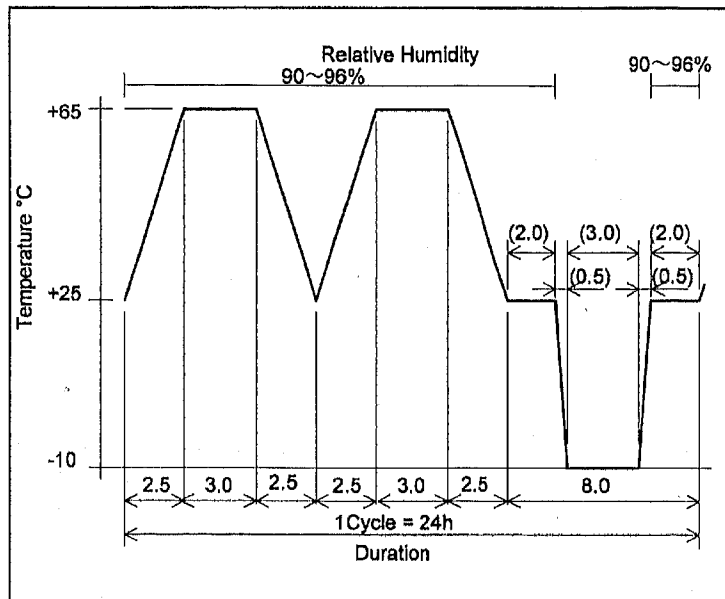
Table 1:

Temperature:	85 °C
Duration:	360 h (Left for 15 days)
Mated/Unmated:	Mated
Recovery:	After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.
Measured item:	[Contact resistance], [Insulation resistance]

Table 2:

Temperature:	60 °C
Humidity:	90 %RH to 95 %RH
Duration:	240 h (Left for 10 days)
Mated/Unmated:	Mated
Recovery:	After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.
Measured item:	[Contact resistance], [Insulation resistance]

Table 3:  
Test condition:



No. of cycles: 10 cycles, subject to one(1) cycle as the above condition.  
 Mated/Unmated: Mated  
 Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.  
 Measured item: [Contact resistance], [Insulation resistance]

14.3 Test equipment

Test equipment	Model	Manufacturer
Constant high temperature chamber	PVH-220	Espec
Constant temperature and humidity chamber	LH-112	Espec
Constant temperature and humidity chamber	PR-1E	Espec

14.4 Test results

Appearance, Construction: No defect.  
 Contact resistance: See page 12 for graphs and result data.  
 Insulation resistance: See page 21 for result data.

## 15 Mechanical operation

### 15.1 Requirements

Appearance, Construction: No defect such as remarkable abrasion, breakage or crack on the component.

Contact resistance:

SF contact: Check variation from initial value.

SW contact: Check.

Insertion and withdrawal forces: Check.

### 15.2 Test method

10000 times of insertions and withdrawals were conducted at the speed of 600 times/h or less.

Used the SD card in the LOCK position when conducting mechanical operation.

Specimen for contact resistance measurement are to undergo mechanical operations using an insertion/withdrawal force tester.

(The card must not be withdrawn completely during each motion.)

Specimen for the measurements are inserted and withdrawn manually and the card was withdrawn completely each time. (This is because the withdrawing value decreases when the card is withdrawn.)

Contact resistance:

Intermediate measurement:

Every 50 times from the 1st to 100th time.

Every 100 times from the 100th to 1000th time.

Every 500 times from the 1000th to 3000th time.

Every 1000 times from the 3000th to 10000th time.

Insertion and withdrawal forces:

Intermediate measurement: 100th, 1000th and 5000th time.

### 15.3 Test equipment

Test equipment	Model	Manufacturer
Insertion and withdrawal forces tester	—————	Hirose

**15.4 Test results**

**Appearance, Construction:** No defect.  
**Contact resistance:** See pages 13 to 15 for graphs and result data.  
**Insertion and extraction forces:** See page 23 for graph and result data.

## 16 Damp heat, cyclic

### 16.1 Requirements

Appearance, Construction: No defect such as breakage, crack or corrosion which impairs the function of the component.

Contact resistance:

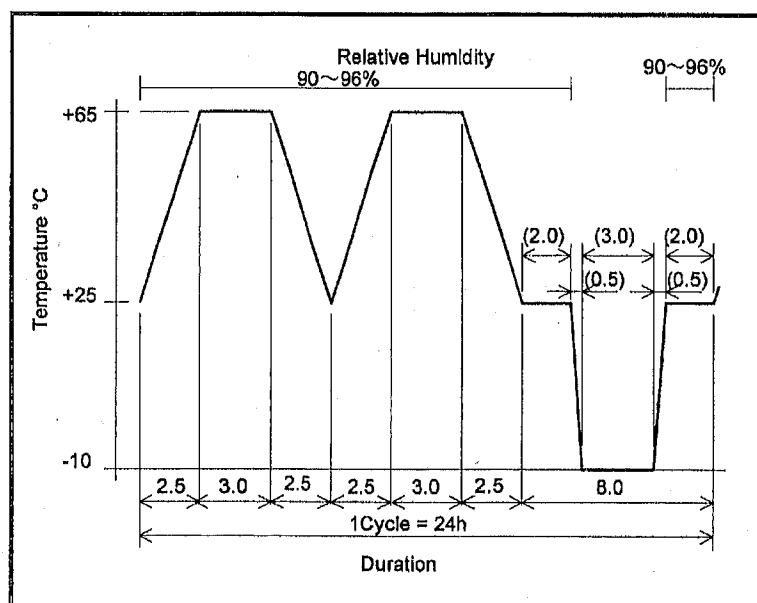
SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

Insulation resistance: 100 MΩ or more.

### 16.2 Test method

The test was conducted according to the conditions specified below:



No. of cycles: 10 cycles, subject to one(1) cycle as the above condition.

Mated/Unmated: Mated

Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.

Intermediate measurement: Measured [Contact resistance] and [Insulation resistance] by each cycle.



## 16.3 Test equipment

Test equipment	Model	Manufacturer
Constant temperature and humidity chamber	PR-1E	Espec

## 16.4 Test results

Appearance, Construction: No defect.

Contact resistance: See page 16 for graphs and result data.

Insulation resistance: See page 22 for result data.

## 17 Harsh environmental

### 17.1 Requirements

Appearance, Construction: No defect such as remarkable abrasion, breakage or crack on the component.

Contact resistance:

SF contact: No rise of 40 mΩ or more from initial value.

SW contact: Check.

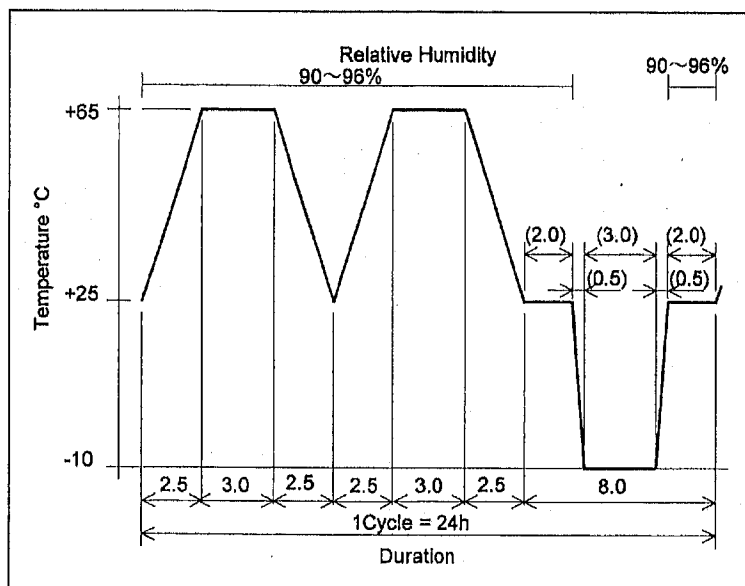
Insulation resistance: 100 MΩ or more.

### 17.2 Test method

- A 1000 times of insertion and withdrawals were conducted at the speed of 600 times/h or less.
- B The test of 1 cycle was conducted under the conditions shown in Table 1.
- C 1000 times of insertion and withdrawals were conducted at the speed of 600 times/h or less.
- D The test of 1 cycle was conducted under the conditions shown in Table 1.
- E 3000 times of insertion and withdrawals were conducted at the speed of 600 times/h or less.
- F The test of 1 cycle was conducted under the conditions shown in Table 1.
- G The test was conducted under the conditions shown in Table 2.

Table 1:

Test condition:



Mated/Unmated: Mated  
 Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.  
 Measured item: [Contact resistance], [Insulation resistance]

Table 2:

H<sub>2</sub>S gas concentration: 3 ppm  
 Temperature: 40 °C  
 Humidity: 80 %RH  
 Duration: 96 h  
 Mated/Unmated: Mated  
 Recovery: After the test, the specimens were left at ambient temperature (15 °C to 35 °C) for 1 to 2 hours.  
 Measured item: [Contact resistance], [Insulation resistance]

### 17.3 Test equipment

Test equipment	Model	Manufacturer
Gas corrosion tester	GH-180MT	Yamazaki Seiki
Constant temperature and humidity chamber	PR-1E	Espec

### 17.4 Test results

Appearance, Construction: No defect.  
 Contact resistance: See page 17 for graphs and result data.  
 Insulation resistance: See page 22 for result data.

## 18 Vibration (Condition 2)

### 18.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Electrical discontinuity: No electrical discontinuity of 1  $\mu$ s or more.

Contact resistance:

SF contact: No rise of 40 m $\Omega$  or more from initial value.

SW contact: Check.

### 18.2 Test method

The test was conducted according to the conditions specified below:

Frequency range: 10 Hz to 55 Hz

Single amplitude: 0.75 mm

Time for one cycle: 10 Hz to 55 Hz to 10 Hz, approx. 1 min

Number of cycles: 3 axial directions, 2 h each, 6 h in total

Connection method: Series connection for all contacts (incl. SW contact)

Test voltage: 5 V d.c.

Test current: 100 mA d.c.

Note: [Electrical discontinuity] was checked continuously during the test.

### 18.3 Test equipment

Test equipment	Model	Manufacturer
Vibration machine	F-300BM/A-E78	Emic
Digital oscilloscope	9360	Lecroy
Variable constant dc volt and ampere generator	PAC35-3	Kikusui Electronics

### 18.4 Test results

Appearance, Construction: No defect.

Electrical discontinuity: No electrical discontinuity.

Contact resistance: See pages 18 for graphs and result data.

## 19 Temperature rise

### 19.1 Requirements

Temperature rise is 30 °C or less when applying current 0.5 A d.c. and 1 A.

### 19.2 Test method

The test was conducted according to the conditions specified below:

Test current: 0.5 A d.c., 1 A  
 Connection method: Series connection for all contacts  
 Element for measurement: Thermocouple (K)  
 Measured part: See the figure below.

Measured part (SMT soldered part: Contact No. 6)



Note 1) All the contacts in series connections are directly connected to No. 9-1, 2-3, 4-5 & 6-7 at connector side SMT part by soldering, and connected to No. 1-2, 3-4, 5-6 & 7-8 at card side with existed board patterns.

Note 2) Temperature rise value (Temperature measured – ambient temperature) must be measured as the values which have the difference 0.5 °C or less on each other at the results of measurement in interval 10 min. and continuously 3 times.

### 19.3 Test equipment

Test equipment	Model	Manufacturer
Programmable pen recorder	HR-4300	Rika Denki Kogyo
Variable constant dc volt and ampere generator	PAD16-10L	Kikusui Electronics

## 19.4 Test results

Unit: °C

Test current 0.5 A	Rise value
Max	5.4
Min	4.5
Avg	5.02

Unit: °C

Test current 1.0 A	Rise value
Max	19.3
Min	18.3
Avg	18.70

## 20 Resistance to soldering heat (solder iron method)

### 20.1 Requirements

Appearance, Construction:	No defect such as looseness of contact, melting of mould or deformation.
Contact resistance:	Check.
Insulation resistance:	Check.
Voltage proof:	Check.

### 20.2 Test method

The test was conducted according to the conditions specified below:

Soldering iron temperature:	350 °C ± 10 °C
Duration:	3 s
Soldered part:	Contact SMT part, Cover case flange
Solder:	Sn-3.0Ag-0.5Cu
Recovery:	Left for 30 min at ambient temperature and humidity
Final inspection:	Observed visually under proper lighting to see if there was no defect such as looseness of contact, or melting or deformation of mould.

### 20.3 Test equipment

Test equipment	Model	Manufacturer
Soldering iron	PRESTO (20 - 130W)	Hakko Kinzoku
Slidac	M105B	Toshiba
Thermometer	H-751	Hozan

### 20.4 Test results

Appearance, Construction:	No defect.
Contact resistance:	See next page for data.
Insulation resistance:	See next page for data.
Voltage proof:	No defect.

## Group N

Contact resistance:

Unit: m $\Omega$ 

	SF Contact	SW Contact	
		S-Protection	S-Detection
Max	23.5	58.6	86.1
Min	18.2	48.6	58.2
Avg	20.56	52.86	71.02
$\sigma_{n-1}$	1.13	4.13	10.89

## Group N

Insulation resistance:

Unit: x 10<sup>4</sup> M $\Omega$ 

	(1) Between adjacent contact	(2) Between SW - A	(2) Between SW - B	(2) Between SW - C	(3) SF - Protection	(4) SF - Detection	(5) SF-S	(6) No. 9 - cover
Max	100	100	100	100	100	100	100	100
Min	100	100	100	100	100	100	100	100



## 21 Resistance to flux penetration

### 21.1 Requirements

Appearance, Construction:	Confirm the parts with flux penetration.
Contact resistance:	Check.
Insulation resistance:	Check.
Voltage proof:	Check.

### 21.2 Test method

The test was conducted according to the following procedure and under the following conditions:

Test procedure:

Immersion in flux → Immersion in solder bath → Final inspection

Test condition:

Soldering iron temperature:	260 °C ± 5 °C
Duration:	5 s ± 1 s
Soldered part:	Contact SMT part, Cover case flange
Solder:	Sn-3.0Ag-0.5Cu
Flux:	NA 200 (manufactured by Tamura Kaken)
Final inspection:	Observe flux penetration by visual check and ultraviolet rays flaw detecting light under proper lighting.

### 21.3 Test equipment

Test equipment	Model	Manufacturer
Solder checker	SAT-5000	Rhesca
Ultraviolet rays flaw detecting light	SunLight 130	Taiyo Bussan

### 21.4 Test result

Appearance, Construction:	Remarkable flux penetration not found.
Contact resistance:	See next page for data.
Insulation resistance:	See next page for data.
Voltage proof:	No defect.

## Group O

Contact resistance:

Unit:  $m\Omega$ 

	SF Contact	SW Contact	
		S-Protection	S-Detection
Max	23.2	59.5	82.6
Min	18.9	45.6	62.1
Avg	20.58	54.36	72.64
$\sigma_{n-1}$	0.99	6.72	8.32

## Group O

Insulation resistance:

Unit:  $\times 10^4 M\Omega$ 

	(1) Between adjacent contact	(2) Between SW - A	(2) Between SW - B	(2) Between SW - C	(3) SF - Protection	(4) SF - Detection	(5) SF-S	(6) No. 9 - cover
Max	100	100	100	100	100	100	100	100
Min	100	100	100	100	100	100	100	100

## 22 Contact retention force

### 22.1 Requirements

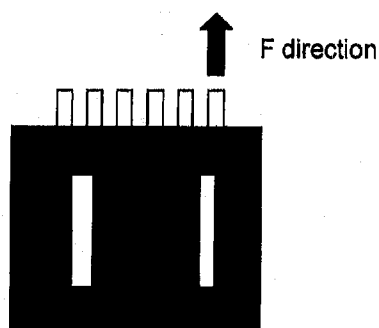
Check.

### 22.2 Test method

Fixed the connectors as shown on the following figure, and measured according to the conditions specified below.

Pulling velocity: 30 mm/min

Pulling direction: "F" direction (see the figure shown below)



**Figure: Skeleton figure of testing method**

### 22.3 Test equipment

Test equipment	Model	Manufacturer
Insertion and withdrawal force tester	1840	Aikoh Engineering

### 22.4 Test results

Unit: N

Max	5.8
Min	3.4
Avg	4.87
$\sigma_{n-1}$	0.59

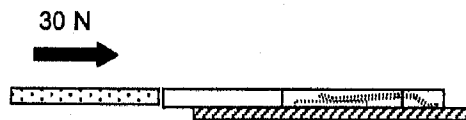
## 23 Card insertion force with reverse side

### 23.1 Requirement

Check.

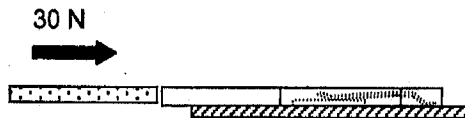
### 23.2 Test method

- (1) Insert the card in the reverse side up and apply a force of 30 N/min. 5 times.



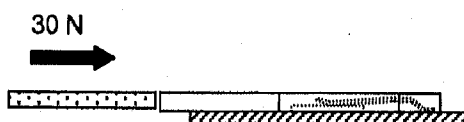
**Figure 1: Skeleton figure of testing method**

- (2) Insert the card in the reverse direction and apply a force of 30 N/min. 5 times.



**Figure 2: Skeleton figure of testing method**

- (3) Insert the card in the reverse direction and the reverse side up, and apply a force of 30 N/min. 5 times.



**Figure 3: Skeleton figure of testing method**

### 23.3 Test equipment

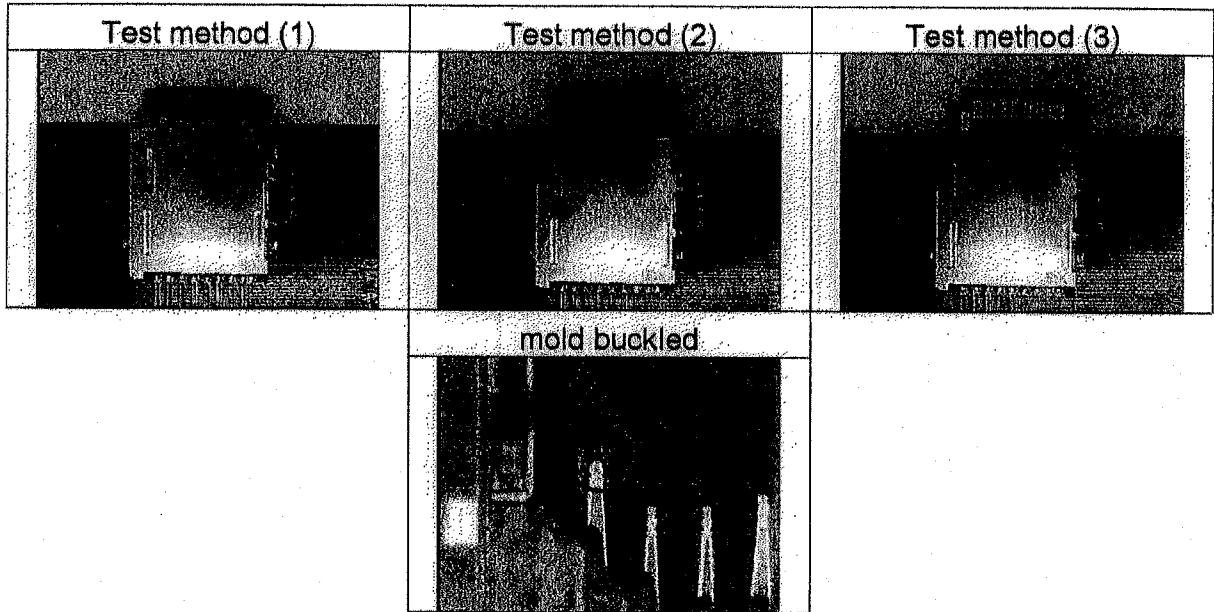
Test equipment	Model	Manufacturer
Tension gauge	15 kg	Ohba Keiki

23.4 Test results

Test method (1): Engaged midway. There were no defects such as damaged parts.

Test method (2): Engaged midway. The molding of contact No. 9 (at the very end) buckled onto the contact. (Continuity was lost)

Test method (3): Engaged midway. There were no defects such as damaged parts.



## 24 Card wrenching strength

### 24.1 Requirements

Check.

### 24.2 Test method

Fixed the connectors under the following condition in the tentative insertion state, and measure destruction strength at time of pushing card in upper/down and left/right directions.

Pulling speed: 30 mm/min

Pulling direction: "F" direction (see the figure shown below)

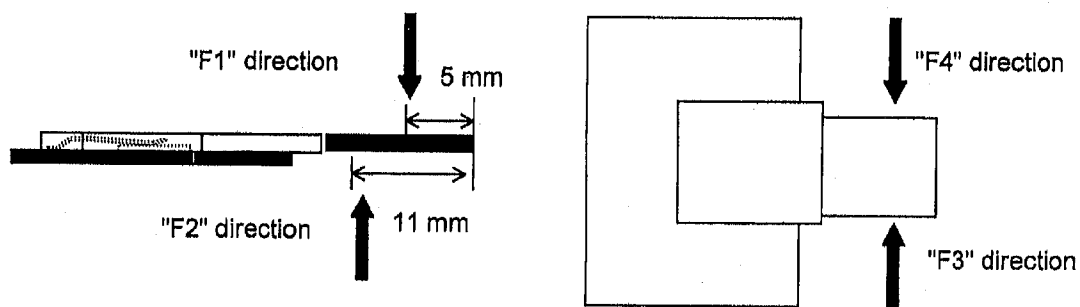


Figure: Skeleton figure of testing method

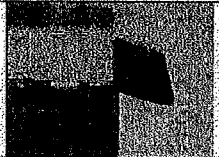
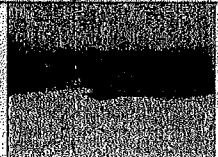


### 24.3 Test equipment

Test equipment	Model	Manufacturer
Insertion and withdrawal force tester	1840	Aikoh Engineering

## 24.4 Test results

Unit: N

	F1 direction	F2 direction	F3 direction	F4 direction
Max	185.3	89.2	88.1	111.5
Min	184.2	87.5	86.2	98.2
Avg	184.75	88.35	87.15	104.85
$\sigma_{n-1}$	0.78	1.20	1.34	9.41

Breakage condition	F1 Card bent	F2 Cover case damaged	F3 card bent	F4 card bent
				

# 材 料 證 明 書

(THE CERTIFICATE FOR MATERIAL OF PLASTIC PART)

發行日 2006年 11月 10日  
(DATE)

貴中

製品名 : DM1AA-SF-PEJ(21)

(PART/CAT.NO.)

上記 製品 下記 材料が 使用 証明 .  
(WE HEREBY CERTIFY THAT THE FOLLOWING MATERIAL  
IS USED FOR THE ABOVE PART.)

部品名 No. (PART NAME)	材 料 品稱 (GENERIC NAME) 番號 (CAT.NO.)	材 料 業 體 (MANUFACTURER)	難 熱 性 UL FLAME CLASS UL FILE NO.
1. 絶縁 CASE	L C P 樹脂 LCP 6040GM	UENO FINE CHEMICALS INDUSTRY LTD	94V-0 E122152
1. EJECTOR	L C P 樹脂 LCP 6040GM	UENO FINE CHEMICALS INDUSTRY LTD	94V-0 E122152

株式會社  
HIROSE KOREA CO.,LTD.





**UENO FINE CHEMICALS INDUSTRY LTD**

1-127 HIGASHIARIOKA ITAMI-SHI HYOGO-KEN 664-0845 JAPAN

Material Designation: **6040GM(e)**

Product Description: Liquid Crystal Polymer (LCP), furnished as pellets.

<b>Color</b>	<b>Min. Thick. (mm)</b>	<b>Flame Class</b>	<b>HWI</b>	<b>HAI</b>	<b>RTI Elec</b>	<b>RTI Imp</b>	<b>RTI Str</b>	<b>IEC GWIT</b>	<b>IEC GWFI</b>
NC, BK	0.75	V-0	-	-	130	130	130	-	-
NC, BK	3.0	V-0	-	-	130	130	130	-	-
<b>CTI: -</b>		<b>HVTR: -</b>		<b>D495: -</b>			<b>IEC Ball Pressure (°C): -</b>		

**Dielectric Strength (kV/mm): -**      **Volume Resistivity (10<sup>x</sup>ohm-cm): -**      **Dimensional Stability(%): -**  
**ISO Tensile Strength (MPa): -**      **ISO Flexural Strength (MPa): -**      **ISO Heat Deflection (°C): -**  
**ISO Tensile Impact (kJ/m<sup>2</sup>): -**      **ISO Izod Impact (kJ/m<sup>2</sup>): -**      **ISO Charpy Impact (kJ/m<sup>2</sup>): -**

(e) May be suffixed by one, two, or three letters except A

Report Date: 5/22/1989

Underwriters Laboratories Inc®

UL94 small-scale test data does not pertain to building materials, furnishings and related contents. UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in components and parts of end-product devices and appliances, where the acceptability of the combination is determined by ULI.

## 環境關理 物質 不使用 證明書

會社名：히로세코리아(주)

部 署：품질보증팀

責任者：차 재환 차장



貴社에 販賣하는 製品 및 製品의 使用材料, 包裝材, 製造工程에  
 含有되는 添加劑 等に 對하여 貴社가 要求하는 管理水準  
 (使用禁止對象)의 物質을 使用하고 있지 않음을 證明합니다.  
 當社의 製品 및 製品의 使用材料, 包裝材, 製造工程에 含有되는  
 添加劑 等に 對하여 以下の 成分으로 構成되어 있음을 報告 합니다.

### (1) 製品 使用素材

NO	제품명	부품명	원자재명	원자재 MAKER	비 고
1	DM1AA-SF-PEJ(21)	EJECTOR	LCP 6040GM	UENO	
		절연CASE	LCP 6040GM-MD	UENO	
		HANARL	HANARL UD-321	KANTO KASEI	
		TERMINAL	C5210R	NIKKO METAL	
		COVER	SUS304	HWANG DAH STEEL	
		PIN	SUS304	NIPPON SEISEN	
		SPRING	SUS304	NAS STAINLESS	
		METAL FITTING	SUS304	HWANG DAH STEEL	
		SPRING	SW-C	SUZUKI METAL	

(2) 測定可能物質의 ICP Data는 別紙 參照 要望

(3) 測定可能物質의 成分 分析 Data는 別紙 參照 要望

以上

# SGS

## TEST REPORT

REPORT NO. JP/2006/070949

DATE: August 10th, 2006

PAGE: 1 OF 1

CLIENT : UENO FINE CHEMICALS IND., LTD. Quality Assurance Dept.  
 SAMPLE DESCRIPTION : UENO LOP6040GM Color No. BK015RL LOT No. FF820-04024  
 CLIENT REF. NO. : UENO06-009  
 TESTING DATE : 2006/07/13 TO 2006/07/20  
 SAMPLE RECEIVED : 2006/07/12

=====

WE HAVE TESTED THE SAMPLE(S) SUBMITTED AS REQUESTED AND THE FOLLOWING RESULTS WERE OBTAINED.

TEST ITEM(S)	UNIT	RESULT	METHOD	INSTRUMENT	DET. LMT(ppm)
CADMIUM(Cd)	ppm	N.D.	EPA3052	ICP-AES	2
MERCURY(Hg)	ppm	N.D.	EPA3052	ICP-AES	2
LEAD(Pb)	ppm	N.D.	EPA3052	ICP-AES	2
CHROMIUM VI(Cr <sup>6+</sup> )	ppm	N.D.	EPA3060A	UV-VIS	2
<b>PBBs(Polybrominated biphenyls)</b>					
Monobromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Dibromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Tribromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Tetrabromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Pentabromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Hexabromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Heptabromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Octabromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Nonabromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Decabromobiphenyl	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
<b>PBDEs(Polybrominated diphenyl ethers)</b>					
Monobromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Dibromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Tribromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Tetrabromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Pentabromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Hexabromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Heptabromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Octabromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Nonabromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5
Decabromodiphenyl ether	ppm	N.D.	Soxhlet Extraction.	GC/MS	5

NOTE: N.D. = not detected

&lt;END&gt;




Kuniyuki Goto / Laboratory Manager  
 SGS Far East Ltd., Green Testing Center

JP 622820

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SGS Far East Ltd. Japan Branch  
 Green Testing Center

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 (+81(0) 45 330 1100 f +81(0) 45 330 1108 www.sgsgroup.co.jp / www.sgs.com

# Material Safety Data Sheet

Revised date Jan. 20, 2003

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## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name : UENO LCP 6040GM  
Name of Company : UENO FINE CHEMICALS INDUSTRY,LTD.  
Section in Charge : CHEMICALS DIV. QUALITY ASSURANCE DEPT.  
Address : 2-4-8,KORAIBASHI,CHUO-KU OSAKA 541-8543  
Phone No. : 81-6-6203-6193  
Fax No. : 81-6-6222-2413  
Emergency Phone No. : 81-795-68-7205

---

## 2. COMPOSITION INFORMATION ON INGREDIENTS

Chemical Family : Wholly Aromatic Liquid Crystal Polyester resin  
Specification of Division : Composition  
Ingredients and Composition : Resin 60wt%  
Glass Fiber+Mineral 40wt%  
Small amount of pigments may contain.  
Serial No. in Official Gazette : (7)-2709 ( base resin )  
CAS-No. : 146647-94-1 ( base resin )

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## 3. HAZARDS IDENTIFICATION

Hazards : Not applicable  
Harmfulness : Not applicable

---

## 4. FIRST-AID TREATMENT

Eye Contact : In the case of molten material , immediately flush and cool with clean water and seek medical attention.  
In the case of solid or powder materials, immediately flush with clean water.  
Seek medical attention if discomfort and incompatibility persist.

Skin Contact : In the case of molten material , immediately cool with clean water.  
Do not forcedly peel off the solidified resin on the skin.  
Seek medical attention if burned.

Inhalation : If nausea is caused by gas from the molten materials , remove immediately to fresh air.  
When nausea persists, seek medical attention.

Ingestion : Help to vomit as much as possible . Seek medical attention if discomfort persists.

---

## 5. FIRE-FIGHTING MEASURES

Extinguishing Media : Water, Form fire-extinguishing agent, powder fire-extinguishing agent, Carbon dioxide gas

Extinguishing Measure : Recommend to use water for extinguishing.  
Usual extinguishing measure is applicable.

Specific Harm : Incomplete combustion of the material may cause carbon mono-oxide , phenol and other toxic gases.

Protect of Extinguisher : Protective equipment such as gas mask should be worn.

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## 6. ACCIDENTAL RELEASE MEASURES

Precautions of human : Clean up by broom or vacuum-cleaner to avoid slipping and tumbling by spilt pellets.

Precautions of environment: Follow the "Manual for preventing release of resin pellets" to avoid ingestion by marine organism and birds.

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## 7. HANDLING AND STORAGE

HANDLING : Avoid to inhale emitted gas during molding.  
Do not directly touch heated resin.

STORAGE : Do not store in high temperature and high humidity conditions, and avoid sunlight.  
Stored away from fire and sources of heat.

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## 8. EXPOSURE CONTROL /PERSONAL PROTECTION

Facility measures : In case of using molten material during molding, establish suitable local ventilation.  
In case of using dust, use an airtight container with dust explosion proof.  
Establish bodywash and eyewash equipments.

Protection

Eye protection : Wear safety glasses or goggles.

Body protection : In case of handling molten material during molding, wear heatproof gloves and long sleeve clothes in order to prevent thermal burns.

Respiratory protection : Wear dustproof mask.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Solid ( pellet )

Melting Point : 320°C

Boiling Point : Not applicable

Vapor pressure : Not applicable

Specific Gravity : 1.74

Solubility in water : Insoluble

Flash Point : No data

Ignition Point : >540°C

Explosion Limit : Not applicable

Flammability : Flammable but self-extinguishing as keeping away from flame.

Ignitivity : Nonspontaneous ignition  
Nonreactive with water

Oxidativity : None

Self-reactivity\*explosively : None

Dust explosively : No data

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## 10. STABILITY AND REACTIVITY

Stability\*Reactivity : Stable and nonreactive on general handling and storage conditions.

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### 11. TOXICOLOGICAL INFORMATION

Corrosive Property	: Unknown
Irritant Property	: Vapor generated during drying and molding may cause irritation to eyes and skins.
Acute Toxicity	: Unknown
Subacute Toxicity	: Unknown
Chronic Toxicity, Long-term toxicity	: Unknown
Carcinogenicity	: Unknown
Mutagenicity	: Unknown
Reproductive toxicity	: Unknown
Teratogenicity	: Unknown
Others	
Harmfulness of glass fibers	: Glass fibers of more than 5 $\mu$ m may cause itching . Skin irritation might form on occasion.

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### 12. ECOLOGICAL INFORMATION

Biodegradability	: Unknown
Bioaccumulation	: Unknown
Fish Toxicity	: Unknown

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### 13. DISPOSAL CONSIDERATIONS

This materials is classified as industrial waste and waste plastics based on "Law for treatment and cleaning of waste".

In case of disposal, ask approved industrial waste disposal agency or commission local governments in accordance with waste disposal law.

In case of burnout, use well-controlled incinerator and treat them in accordance with waste disposal law ,air pollution control law, and water pollution control law.

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### 14. TRANSPORT INFORMATION

UN class and UN number: Not applicable

Notice : Avoid rough handling and contact with water in order to prevent break of bags.  
Stack without drop and damage, and make sure to provide preventing load collapse.

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### 15. REGULATORY INFORMATION

Disposal Regulation : Law for treatment and cleaning disposal waste.

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### 16. OTHER INFORMATION

Ueno Fine Chemicals Industry, LTD. do not assume any liability whatsoever for the accuracy or completeness of the information contained herein, although stated information is prepared based on the

documents, information and data that can be obtained as far as possible.

This material safety data sheet is prepared for general use. Adequate safety and environmental countermeasures for actual uses and applications should be provided in case of unusual use.



Test Report No. F690501/LF-CTSGP06-19124

Date: July 27, 2006

Page 1 of 3

To: UENO FINE CHEMICALS IND, LTD.  
2-4-8  
Koraibashi  
Chuo-ku  
OSAKA  
Japan

The following merchandise was submitted and identified by the client as:

- Commodity : 6040GM-MD(BK015SL)
- SGS File No. : GP06-19124
- Received Date : July 20, 2006
- Test Performing Date : July 21, 2006
- Test Performed : SGS Testing Korea tested the sample(s) selected by applicant with following results
- Test Results : For further details, please refer to following page(s)

Jade Jang  
Monet Jeong  
Jully Oh  
Jerry Jung  
/Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

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SGS Testing Korea Co., Ltd. 322, The Q valley, 566-9, Hoge-dong, Dugan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
t +82 (0)31 4608 000 f +82 (0)31 4608 059 www.sgslab.co.kr www.kr.sgs.com/greenlab  
1002-2, Hwasun-ri, Gonsan-eub, Ulsan-gun, Ulsan, Korea 689-890 t +82 (0)52 239 6908-10 f +82 (0)52 239 6913





Test Report No. F690501/LF-CTSGP06-19124

Date: July 27, 2006

Page 2 of 3

Sample No. : GP06-19124.001

Sample Description : 6040GM-MD(BK015SL)

Style/Item No. : FB220-08091

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium(Cd)	mg/kg	EN 1122(2001), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

Flame Retardants: PBBs/PBDEs

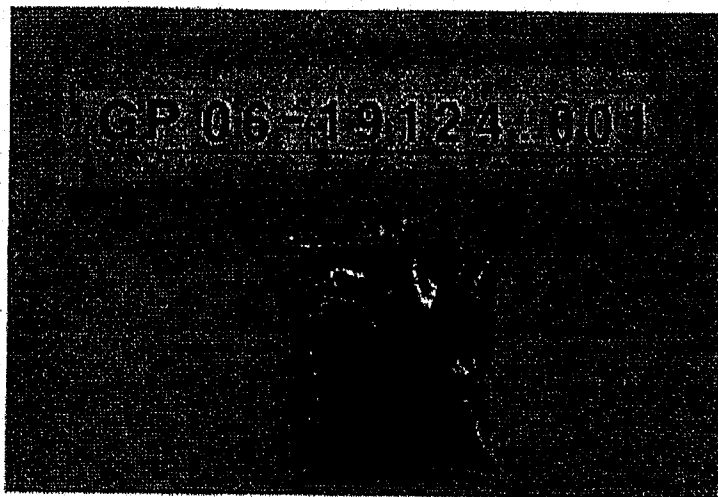
Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Monobromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.

- NOTE: (1) N.D. = Not detected.(<MDL)  
(2) ppm = mg/kg  
(3) MDL = Method Detection Limit  
(4) - = No regulation  
(5) \*\* = Qualitative analysis (No Unit)  
(6) Negative = Undetectable / Positive = Detectable

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SGS Testing Korea Co., Ltd. 322, The Q valley, 555-9, Hoggae-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
t +82 (0)31 4603 000 f +82 (0)31 4603 058 www.sgslab.co.kr www.kr.sgs.com/greenlab  
1102-2, Hwasan-ri, Onsan-eub, Uiju-gun, Ulsan, Korea 680-890 t +82 (0)52 239 6908-10 f +82 (0)52 239 6913

Picture of Sample as Received:



\*\*\* End \*\*\*

- NOTE: (1) N.D. = Not detected (<MDL)  
(2) ppm = mg/kg  
(3) MDL = Method Detection Limit  
(4) - = No regulation  
(5) \*\* = Qualitative analysis (No Unit)  
(6) Negative = Undetectable / Positive = Detectable

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SGS Testing Korea Co., Ltd. 322, The Ovalley, 555-9, Hoge-dong, Dangan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
t +82 (0)31-4608 000 f +82 (0)31-4608 059 www.sgslab.co.kr, www.kr.sgs.com/greenlab  
1002-2, Hevasan-ri, Onsan-eub, Ulsan-gun, Ulsan, Korea 689-800 t +82 (0)52 239 6906-10 f +82 (0)52 239 6913

## 製品安全データシート(MSDS)

改訂日 2002年6月20日

### 1. 製品及び会社情報

製品 : UENO LCP 6040GM-MD  
 会社名 : 上野野製薬株式会社  
 担当部門 : 化学薬品本部 化学薬品研究所  
 住所 : 〒669-1339 兵庫県三田市テクノパーク4-1  
 電話番号 : 0795-68-7205  
 FAX 番号 : 0795-68-7217  
 緊急時連絡先 : 化学薬品本部 営業部 LCP 樹脂販売課  
 電話番号 : 06-6203-6193

### 2. 組成、成分情報

樹脂の分類 : 全芳香族液晶ホリエステル樹脂  
 仕様区分 : 組成物  
 組成 : 樹脂成分 60wt%  
 補強材(ガラス繊維+ミネラル) 40wt%  
 一部のグレードには少量の顔料を含む。  
 官報公示整理番号 : 未定 (ベース樹脂)  
 CAS-No. : 146647-94-1 (ベース樹脂)

### 3. 危険有害性の要約

危険性 : 該当しない。  
 有害性 : 該当しない。

### 4. 応急処置

目に入った場合 : 溶融物の場合は、直ちに清浄な水で十分に冷やすと同時に洗浄し、速やかに医師の診断を受ける。  
 通常の固体、粉体の場合は、直ちに清浄な水で洗浄する。不快感や違和感が残るようであれば医師の診断を受ける。  
 皮膚に付着した場合 : 溶融物の場合は、直ちに清浄な水で十分に冷やす。皮膚上の固まった樹脂を無理に剥がさない。火傷があれば医師の診断を受ける。  
 吸入した場合 : 溶融物から発生するガスを吸って気分が悪くなった場合は、直ちに新鮮な空気の場所に移動し、回復を待つ。回復しないようであれば医師の診断を受ける。  
 飲み込んだ場合 : 出来るだけ吐き出す。不快感が残るようであれば医師の診断を受ける。

### 5. 火災時の措置

消火剤 : 水、泡沫消火剤(エアフォーム)、粉末消火剤、炭酸ガス  
 消火方法 : 水をかけて消火するのが良い。一般の火災と同じ消火法を用いる。  
 特定有害性 : 不完全燃焼の場合は、一酸化炭素、フェノール等の有害なガスを発生する。  
 消火を行う者の保護 : 防毒マスクや保護具を使用する。

## 6. 漏出時の措置

人体に対する注意事項 : 滑って転倒するのを防止するために、道路や床にこぼした場合は、ほうきや掃除機等で全量回収する。

環境に対する注意事項 : 海洋生物、鳥類が摂取するのを防止するために、「樹脂ペレット漏出防止マニュアル」に従う。

## 7. 取り扱い及び保管上の注意

取り扱い : 成形加工時は、発生ガスを吸入しないようにする。  
高温樹脂には直接触れないようにする。

保管 : 高温多湿、直射日光下での保管は避ける。  
火気や熱源より遠ざけて保管する。

## 8. 暴露防止及び保護措置

設備対策 : 成形加工等で加熱溶融する場合は、有効な局所排気装置を設置する。  
粉塵を扱う場合は、粉塵爆発対策を施した密閉容器を使用する。  
作業場所近辺に、洗身・洗眼設備を設置する。

### 保護具

目の保護具 : 保護メガネ、ゴーグル等を着用する。

身体の保護具 : 成形加工等で加熱溶融樹脂を扱う際には、火傷防止のため、耐熱手袋、長袖の衣服を着用する。

呼吸器の保護具 : 防塵マスクを着用する。

## 9. 物理的及び化学的性質

概観等 : ペレット状固体

融点 : 320°C

沸点 : 該当しない。

蒸気圧 : 該当しない。

比重 : 1.74

溶解度 : 水に不溶

引火点 : 知見なし。

発火点 : 540°C以上

爆発限界 : 該当しない。

可燃性 : 可燃性であるが、炎から遠ざけると自己消火性を示す。

発火性 : 自然発火性なし。  
水との反応性なし。

酸化性 : なし。

自己反応性・爆発性 : なし。

粉塵爆発性 : 知見なし。

## 10. 安定性及び反応性

安定性・反応性 : 一般的な保管・取り扱いにおいては安定であり、反応性はない。

## 11. 有害性情報

皮膚腐食性	: 知見なし。
刺激性(皮膚、眼)	: 乾燥、溶融時に発生するガスは、皮膚、眼を刺激することがある。
急性毒性	: 知見なし。
亜急性毒性	: 知見なし。
慢性毒性・長期毒性	: 知見なし。
がん原性	: 知見なし。
変異原性	: 知見なし。
生殖毒性	: 知見なし。
催奇形性	: 知見なし。

## その他

ガラス繊維に対する有害性: 直径 5  $\mu\text{m}$  程度以上の繊維が皮膚を刺激し、かゆみを伴うことがある。  
時として、刺激性の皮膚炎を起こすこともある。

## 12. 環境影響情報

分解性	: 知見なし。
蓄積性	: 知見なし。
魚毒性	: 知見なし。

## 13. 廃棄上の注意

『廃棄物の処理及び清掃に関する法律』(廃掃法)の産業廃棄物、廃プラスチック類に該当する。

廃掃法に従って、産業廃棄物処理業者、もしくは地方自治体(処理を引き受けている場合)に、委託する。

焼却処分するときは、管理された焼却設備を用いて、廃掃法、大気汚染防止法、水質汚濁防止法に沿って、処分する。

## 14. 輸送上の注意

国連分類及び国連番号: 該当しない。

注意事項 : 梱包袋の水濡れに注意し、乱暴に取り扱わない。  
落下、損傷のないように積み込み、荷崩れ防止を確実にを行う。

## 15. 適用法例

廃掃法 : 廃棄物の処理及び清掃に関する法律

## 16. その他の情報

記載内容の取り扱い : 記載内容は、現時点で入手し得る資料、情報、データに基づいて作成しているが、その内容の厳密性について責任を負うものではない。

記載内容は、通常の手続きを前提に作成しているため、特殊な取り扱いをする場合は、用法、用途に適した安全・環境対策を講じる必要がある。

TO : KORIYAMA HIROSE ELECTRIC CO., LTD.

Report of Hazardous Substances

We report that our products do not contain the following substances.

Product name: HANARL UD-321

< RoHS Substances >

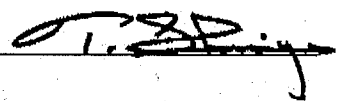
- 1. Cadmium and its compounds (Cd)
- 2. Lead and its compounds (Pb)
- 3. Mercury and its compounds (Hg)
- 4. Hexavalent chromium (Cr<sup>+6</sup>)
- 5. Poly brominated biphenyls (PBB)
- 6. Poly brominated diphenyl ethers (PBDE)

Date : JUNE 14 , 2006

Company : KANTO KASEI LTD.

TECHNICAL CONTROL DIVISION

Name : TAKAHIKO SHINYA

Signature: 

096783-0-11

**Kanto  
Kasei**

TO : KORIYAMA HIROSE ELECTRIC CO., LTD.

関東化成工業株式会社

〒100-0005

東京都千代田区丸の内 1-8-1

TEL : 03(3218)7111 (代)

FAX : 03(3218)7100

### Measurement Data

Measurement Method : Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

Pre-conditioning : Microwave decomposition method

Product Name	Cadmium (Cd)	Lead (Pb)
HANARL UD-321	< 5 ppm	< 5 ppm

DATE : JUNE 14, 2006

COMPANY : KANTO KASEI LTD.

TECHNICAL CONTROL DIV.

NAME : TAKAHIKO SHINYA

SIGNATURE: 

**KANTO KASEI LTD.**

1-8-1, Marunouchi, Chiyoda-ku, Tokyo 100-0005, Japan TEL:03(3218)7111 FAX:03(3218)7100

関東化成工業(株)

096783-0-11

製品安全データシート

1/3

【製品名】 HANARL UD-321

整理番号 028

作成日：1999年3月1日

改訂日：2003年12月22日

## 【1. 製造情報】

会社名： 関東化成工業株式会社  
 住所： 〒100-0005 東京都千代田区丸の内1-8-1  
 担当部門： 品質管理課 / 担当者 菊地 亜美  
 TEL： 03(3218)7111 / FAX 03(3218)7100  
 緊急連絡先： 03(3218)7111

## 【2. 物質の特定】

単一製品・混合物の区別： 混合物  
 成分及び含有量： ハイドロフルオロエーテル 90～99wt%  
 フッ素油、ポリテトラフルオロエチレン(PTFE)、その他 1～10wt%  
 化学式又は構造式： 非公開  
 官報公示整理番号(化審法、安衛法)： 非公開  
 CAS NO.： 非公開  
 国連分類及び国連番号： 該当せず

## 【3. 有害性の分類】

分類の名称： 分類基準に該当しない。  
 危険性： 特になし。  
 有害性： 非常に高い温度に加熱された場合は、フッ化水素、パーフルオロイソブチレン等の有害な熱分解物を生成することがある。

## 【4. 応急処置】

目に入った場合： 大量の水で15分以上洗い流す。刺激を感じるようであれば必要に応じ医師の診断を受ける。  
 皮膚に付着した場合： 紙や布等で拭取り、石けんにて洗い流す。  
 吸入した場合： 徴候や症状がでた場合は、新鮮な空気の下に移動する。徴候や症状が持続する場合は、医師の診断を受ける。  
 飲み込んだ場合： 無理には吐かせず、直ちに医師の診断を受ける。

## 【5. 火災時の措置】

消火方法： 本製品は不燃性で引火しないが、容器の周辺で火災が発生した場合は、速やかに容器を安全な場所に移動する。移動不可能な場合は、容器及び周辺を冷却し、延焼を防ぐ。熱による分解生成物は有毒な為、吸入しないように注意する。  
 消火剤： 本製品は不燃性で引火しない為、水、泡、炭酸ガス、粉末等のうちで周囲の火災に適した消火剤を使用する。

## 【6. 漏出時の措置】

土砂、ウェス等に吸着させて空容器へ回収し、その後を完全にウェス等で拭き取る。密閉された場所で漏洩した場合、ほかの人に警告しすぐに避難する。密閉された場所で過剰の蒸気に曝露すると、酸欠を引き起こすことがある。



【製品名】 HANARL UD-321

【7. 取扱いおよび保管上の注意】

- 取扱い： 1. 取扱は換気のよい場所で行い、長時間もしくは繰り返し高濃度蒸気を吸入しないこと。  
 2. 常温で取扱うものとし、その際、水分、きょう雑物の混入に注意すること。  
 3. 200℃以上になる熱源、裸火、アーク発生源等を側に置かないこと。  
 4. 取扱中は禁煙。  
 5. 容器は必ず密閉する。漏れたり、溢れたりしないようにし、みだりに蒸気を発散させないように注意する。  
 6. 取扱後は本品が接触した箇所を石けんと水で十分に洗い、喫煙する場合は本品が付着したタバコを吸わないこと。

- 保管： 1. 冷暗所で換気の良い場所に保管する。  
 2. 火気及び引火性物質との接触、並びに同一場所での保管を避ける。

【8. 暴露防止措置】

- 管理濃度： 設定されていない  
 許容濃度： OSHA, PEL 設定されていない  
           ACGIH, TLV 設定されていない  
 設備対策： ミストが発生する場合は発生源の密閉化、または排気装置を設ける。作業後、手洗い等ができるような設備を設ける。  
 呼吸保護具： 蒸気、ミストの吸入をさける。熱分解物が発生した場合、半面送気型マスク、全面送気型マスクを使用する。  
 保護眼鏡： サイドシールド付きの安全眼鏡を着用する。  
 保護衣： 皮膚との接触を避ける。

【9. 物理・化学的性質】

- 外 観： 乳白色  
 形 状： 液 体  
 臭 気： わずかなエーテル臭  
 密 度： 約 1.52 g/cm<sup>3</sup> (25℃)  
 沸 点： 約 60℃  
 蒸 気 圧： 約 26.0 kPa (20℃)  
 蒸気密度(空=1)： 約 8.6 (0℃)  
 蒸発速度： データなし  
 水 溶 性： 不 溶

\*色相以外は溶剤のみのデータ

【10. 危険性情報】

- 引火点： な し  
 発火点： 約 405℃  
 爆発範囲-下限(%)： な し  
 爆発範囲-上限(%)： な し  
 酸化性： データなし  
 安定性： 常温、常圧下で安定  
 避けるべき物質： 強酸、強アルカリ  
 避けるべき条件： 沸点以上に温度が上がることを避ける。非常に高い温度に過熱された場合は、フッ化水素、パーフルオロイソブチレン等の有毒な熱分解物を生成することがある。  
 その他： 特になし

【製品名】 HANARL UD-321

【11. 有害性情報】

眼 : 眼に対する刺激は少ないと考えられる。  
 皮膚 : 皮膚に対する刺激は少ないと考えられる。  
 急性毒性 : 経口 ラット LD<sub>50</sub> ⇒ 5g/kg  
 吸入 ラット LC<sub>50</sub> > 100,000 ppm (4h)

\* 溶剤のみのデータ

【12. 環境影響情報】

オゾン破壊係数(ODP) : 0 (CFC-11=1)  
 地球温暖化係数(GWP) : 320 (CO<sub>2</sub>=1 100年積算)  
 大気中寿命 : 4.1年

\* 溶剤のみのデータ

【13. 廃棄上の注意】

関係法令に基づき自社で適正に処理するか、または知事等の許可を受けた産業廃棄物処理業者、もしくは地方公共団体がその処理を行っている場合にはそこに委託して処理をする。

【14. 輸送上の注意】

運搬に際しては容器に漏れのないことを確かめ、著しく摩擦または動揺を起こさないように運搬すること。

【15. 適用法令】

消防法 : 該当せず  
 労働安全衛生法 : 該当せず  
 船舶安全法 : 該当せず  
 毒物及び劇物取締法 : 該当せず  
 PRTR法 : 該当せず

【16. その他】

\* 記載内容は現時点で入手できる資料、情報、データに基づいて作成しておりますが、新しい知見により改訂されることがあります。また注意事項は通常の取扱を対象としたものであって、特別な取扱をする場合は、用途、用法に適した安全対策を実施の上、ご利用ください。記載内容は情報提供であって、安全を保証するものではありません。

To KODO CO.,LTD.

October 13th, 2006

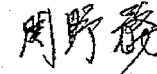
## Test Report

Manufacturer's Name

NIPPON MINING & METALS CO., LTD.  
KURAMI WORKS

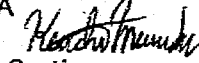
Signature of Person in Charge

TUTOMU SEKINO  
Technical Supervisor,  
Quality Assurance



Signature of Person Responsible

KEIICHI MURAOKA  
Manager,  
Quality Assurance Section



### 1. Test Result

No.	Alloy	Test Item	Pb	Cd	Cr <sup>※1</sup>	Hg	Note
		Detection Limit	50ppm	1ppm	5ppm	2ppm	
		Unit	ppm	ppm	ppm	ppm	
1	C2680R		<50	<1	<5	<2	
2	C5191R		<50	<1	<5	<2	
3	C5210R		<50	<1	<5	<2	

#### Special Notes

※1: Results of Hexavalent Chromium (Cr<sup>6+</sup>) are shown as the total Chromium values.  
Measured Sample N=1

### 2. Measurement method

Pb, Cd, Hg, Cr : ICP-AES

To. HIROSE ELECTRIC CO., LTD.

### MATERIAL SAFETY DATA SHEET

MSDS FILE No. (KURAMI WORKS) : 05-1114

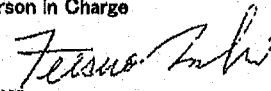
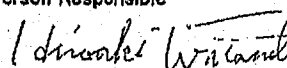
(based on Form OSHA-174)

IDENTITY ( AS Used on Label and List )

Product Class : Phosphor Bronze Strip  
 Trade Name : JIS H3130 C5210R (Equivalent to ASTM B103 C52100)  
 CAS No. : Copper: 7440-50-8, Tin: 7440-31-5, Phosphor: 7723-14-0  
 Chemical Composition

	Content (wt-%)	CAS No.
Tin (Sn)	7.0~9.0	7440-31-5
Phosphor (P)	0.03~0.35	7723-14-0
Copper (Cu)	Balance	7440-50-8
Sn+P+Cu	99.7 ≤	-

#### Section I

Manufacturer's Name <b>NIKKO METAL MANUFACTURING CO., LTD.          KURAMI WORKS</b>	Date Prepared <b>January 27th, 2005</b>
Address <b>3 Kurami Samukawa-cho          Kouza-gun Kanagawa prefecture          253-0101 JAPAN</b>	Signature of Person in Charge  <b>MAKI, Tetsuo</b> Senior Technical Supervisor, Quality Assurance
Telephone Number for Information (Quality Assurance) <b>+81-467-75-7285</b>	Signature of Person Responsible  <b>WATANABE, Hiroaki</b> Manager, Quality Assurance Section
Facsimile Number for Information (Quality Assurance) <b>+81-467-74-6971</b>	

#### Section II Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity : Names OSHA PeI ACGIH TLV)

Nothing for ordinary service condition

#### Section III Physical / Chemical Characteristics

Boiling Point	2630 °C for Copper 2275 °C for Tin	Specific Gravity (H2O = 1)	8.80
Vapor Pressure (mmHg)	N/A	Melting Point	1025 deg. centi. for C5210 Phosphor Bronze
Vapor Density (Air = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A
Solubility in Water	N/A		
Appearance and Odor	Brown - Red (solid) : Odor - None		

#### Section IV Fire and Explosion Hazard Data

Flash Point (Method Used)	N/A	Flammable Limits	N/A	LEL	N/A	UEL	N/A
Extinguishing Media	N/A ( stable , nonflammable substance )						
Special Fire Fighting Procedures	Not specified						
Unusual Fire and Explosion Hazards	Metal products do not present fire or explosion hazards under normal conditions.						

Section V Reactivity Data			
Stability	Unstable		Conditions to Avoid
	Stable	X	
Incompatibility (Materials to Avoid)			
Nothing			
Hazardous Decomposition or Byproducts			
Nothing			
Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	
Section VI Health Hazard Data			
Route(s) of Entry :	Inhalation ?	Skin ?	Ingestion ?
	N/A	N/A	N/A
Health Hazardous (Acute and Chronic)			
N/A			
Carcinogenicity :	NTP ?	IARC Monographs ?	OSHA Regulated ?
	N/A	N/A	N/A
Signs and Symptoms of Exposure			
N/A			
Medical Conditions			
Generally Aggravated by Exposure			
N/A			
Emergency and First Aid Procedures			
N/A			
Section VII Precautions for State Handling and Use			
Steps to Be Taken in Case Material is Released or Spilled			
N/A			
Waste Disposal Method			
Collect scrap for remelting.			
Precautions to Be Taken in Handling and storing			
<u>For Handling</u>			
<ul style="list-style-type: none"> <li>·Put safety gloves on to protect your hands from edges of coils which might cut your hands.</li> <li>·Wear safety glasses when metal powders or chips are expected to be generated in the work.</li> <li>·Put safety shoes on when handling heavy coils.</li> </ul>			
<u>For Storing</u>			
<ul style="list-style-type: none"> <li>·The environment of stocking area should be free from acid, alkali, chloride, sulfide and other corrosive chemicals to prevent from rusting or corrosion.</li> </ul>			
Other Precautions			
No special requirements			
Section VIII Control Measures			
Respiratory Protection (Specify Type)			
Wearing a mask be recommended in the work such as abrasion and buffing which generates metal powders or chips.			
Ventilation	Local Exhaust	Special	
	None	None	
	Mechanical (General)	Other	
	None	None	
Protective Gloves			
Put safety gloves on to protect your hands from edges of coils which might cut your hands.			
Eye Protection			
Wear safety glasses when metal powder is expected to be generated in the work.			
Other Protective Clothing or Equipment			
Put safety shoes on when handling heavy coils.			
Work / Hygienic Practices			
None			
Influence to environments			
Fish on toxicity : TLm 48 hr. on CuSO <sub>4</sub>			
Salmogairdeneri : 0.038 ~ 0.8 ppm			
Oryzias Latipes : 2.1 ~ 24ppm			



## Test Report

爐大鋼鐵股份有限公司  
台北縣樹林市樹林工業區樹潭街7號

報告號碼 : CE/2006/22161A  
日期 : 2006/02/17  
頁數 : 1 of 2

以下測試樣品乃供應廠商所提供及確認：

樣品名稱 : 不銹鋼材料  
產品型號 : SUS304  
收件日期 : 2006/02/10  
測試日期 : 2006/02/10 TO 2006/02/17

### 測試結果

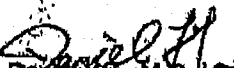
測試部位 NO.1 : 銀色金屬板

測試項目	單位	測試方法	偵測極限值	結果
六價鉻	ppm	依照US EPA 3060A方法, 用UV-VIS 做分析	2	N.D.
鎘	ppm	依照 EN1122 方法B:2001或其他酸 消化方法, 用感應耦合電漿原子發 射光譜儀 (ICP-AES) 做分析	2	N.D.
汞	ppm	依照 US EPA 3052 方法或其他酸 消化方法, 用感應耦合電漿原子發 射光譜儀 (ICP-AES) 做分析	2	N.D.
鉛	ppm	依照 US EPA 3050B 方法或其他酸 消化方法, 用感應耦合電漿原子發 射光譜儀 (ICP-AES) 做分析	2	N.D.

備註: (1) N.D. = Not detected, (<MDL) / 未檢出 (低於偵測極限值)

(2) ppm = mg/kg / 百萬分之一

(3) MDL = Method Detection Limit (偵測極限值)

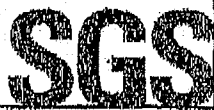
  
Daniel Yen, M.R., Operation Manager  
Signed for and on behalf of  
SGS TAIWAN LTD.

This Test Report is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitations of liability, indemnification, and jurisdictional issues defined therein. The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full, without prior written permission of the Company. 此報告是根據本公司訂定之檢驗服務條款所製作。請注意此報告列於背面。除本公司之簽字、印章、電腦標明檢驗日期外，此報告如無除簽字外，則無效。本報告未經本公司簽字許可，不可部份複製。

TW 2932796

SGS Taiwan Ltd. / No. 33 Wu Chyuan Road, Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五權路33號  
台灣檢驗科技股份有限公司 (886-2) 2268-8889 (886-2) 2299-9237 www.taiwan.sgs.com

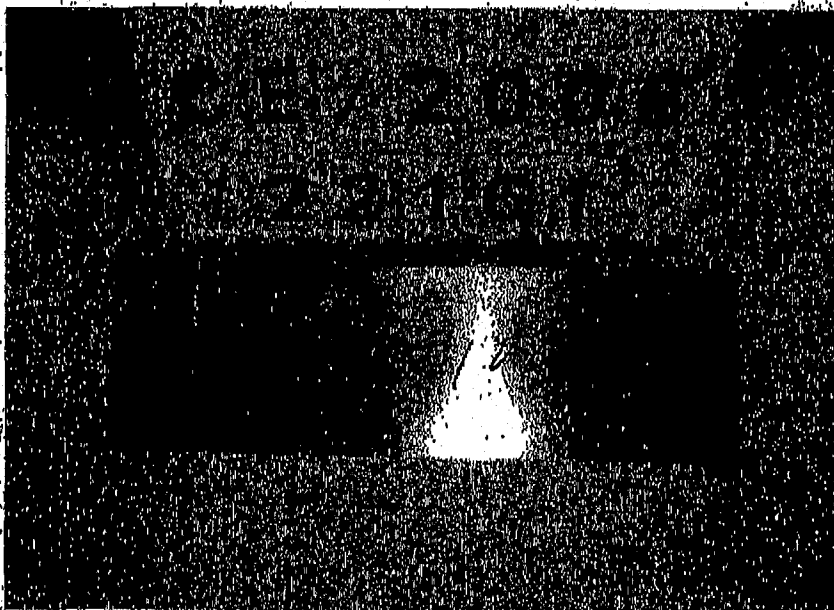
Member of SGS Group



# Test Report

煌大鋼鐵股份有限公司  
台北縣樹林市樹林工業區樹潭街7號

報告號碼 : CE/2006/22161A  
日期 : 2006/02/17  
頁數 : 2 of 2



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SGS Taiwan Ltd. | No. 39 Wu Chyuan Road, Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五權路39號  
台灣檢驗科技股份有限公司 | t (886-2) 2298-8888 f (886-2) 2298-3237 www.tw.sgs.com

Member of SQA Group

1001

### MATERIALS SAFETY DATA SHEET

**HWANG DAH STEEL INC.**  
 NO.7, SHU TAN STREET, SHU LIN INDUSTRIAL  
 DISTRICT, SHU LIN CITY, TAIPEI, TAIWAN.  
 Phone No. (02) 2681-2082  
 Fax No. (02) 2681-2921  
 e-mail : [hwangdah@ms29.hinet.net](mailto:hwangdah@ms29.hinet.net)  
 Manager of this section : CHEN HSIN FANG  
 Date of Last Revision : FEB. 21, 2005



#### Section 1

##### Product Identification

1-1 Product Name : Stainless Steel-SUS304  
 1-2 Specification : JIS G 4313 Cold rolled stainless steel strip for springs.

#### Section 2

##### Chemical Composition

Element	Content(Wt%)
Manganese (Mn)	2.00 max
Silicon (Si)	1.00 max
Nickel (Ni)	8.00 - 10.50
Chromium (Cr)	18.00 - 20.00
Iron (Fe)	Balance

#### Section 3

##### Physical Data and Chemical Properties

3-1 Physical State : Solid  
 3-2 Color : Silvery White  
 3-3 Odor : None  
 3-4 Density : 7.99g/cm<sup>3</sup>  
 3-5 Melting Point : 1400 - 1450°C

#### Section 4

##### 4-1 Hazards Identification

Name of identification : None

煌大鋼鐵股份有限公司  
 SUS 304  
 1/2



**4-2 Health Hazard Data**

The Steel has no explosion, no ignition, no protection of water, no oxidation, No acute toxicity, no corrosion and no irritation under normal condition. However an allergy may occur by contact with skin for a long term. Also in case the edge of product is sharp-cut may be owned by handling With bare hands.

**4-3 First Aid**

Wash affected area with water. If a serious irritation occurs, seek medical attention.

**Section 5**

**Fire and explosion**

5-1 The steel is non-flammable, but the packing materials are flammable.

5-2 Extinguishing Media : Not specified.

5-3 Fire fighting procedure : Normal procedure, Protective water of body is recommended.

**Section 6**

**Handling and Storage**

6-1 Handling : Wear Protective clothing and gloves.

6-2 Storage : The product should be kept at safe and no water area in warehouse.

**Section 7**

Ecological Information : None

**Section 8**

**Disposal Condition**

Dispose as industrial waste according to the regulation.

**Section 9**

**Transportation Information**

Transport the steel according to Section 6 and transportation regulations.

**Section 10**

Applicable Law : None

The information and recommendation on this sheet is based on available Materials and data at the present data.

No.0019

2005年6月25日

東都発条 株式会社 御中

日本精線株式会社  
品質保証部長 新川 博司

環境負荷物質分析証明書

対象材: SUS 304 W.P.B

対象物質: カドミウム及びその化合物  
鉛及びその化合物  
水銀及びその化合物  
六価クロム化合物

検査報告書 報告書 No. JP/2005/040531 日付: 2005年04月28日

SGS ファーイストリミット グリーンステイタメント  
〒240-0005 横浜市磯子区神戸町134  
TEL: 045-890-1100 FAX: 045-890-1108

測定結果は下記の通りであることを証明いたします。

御社オーダーNo. :  
試料・サンプル名等 : SUS 304 W.P.B  
サンプル受領日 : 04/11/2005  
測定期間 : 04/14/2005~04/19/2005  
試料外観・色等 : ステンレス

測定結果:

測定項目	単位	結果	測定方法・前処理	測定機器	検出限界
Cd	ppm	検出せず	EN1122B	ICP-AES	2
Pb	ppm	検出せず	EPA3050B	ICP-AES	2
Hg	ppm	検出せず	EPA3051A	ICP-AES	2
Cr <sup>6+</sup>	ppm	検出せず	EPA8060A	UV-VIS	2


JP 509969

\*\*\*以上\*\*\*

※本証明書は、SGS ファーイストリミット グリーンステイタメント 様の分析結果に基づいて作成したものです。

材料メーカー: 日本精線  
メーカー: 海洋精線

## 製品安全データシート

整理番号	MSDS 304	頁	1/2																					
製品名称	ステンレス鋼線 SUS 304	作成日	2006年6月23日																					
<b>1. 化学物質等及び会社情報</b> <ul style="list-style-type: none"> <li>・会社名 : 日本精線株式会社 枚方工場</li> <li>・住所 : 大阪府枚方市池之宮4丁目17番1号</li> <li>・担当部門 : 品質保証部 鋼線品質管理課  電話番号 072-840-1264  FAX番号 072-840-1483</li> <li>・部門責任者 : 辛木保 </li> <li>・製品名称 : ステンレス鋼線 SUS 304</li> </ul>																								
<b>2. 組成、成分情報</b> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="3">SUS 304 (線材)</th> </tr> <tr> <th>成分名</th> <th>質量%</th> <th>CAS No.</th> </tr> </thead> <tbody> <tr> <td>鉄</td> <td>66.5 ~ 74</td> <td>7439-89-6</td> </tr> <tr> <td>マンガン</td> <td>≤ 2</td> <td>7439-96-5</td> </tr> <tr> <td>ニッケル</td> <td>8 ~ 10.5</td> <td>7440-02-0</td> </tr> <tr> <td>クロム</td> <td>18 ~ 20</td> <td>7440-47-3</td> </tr> <tr> <td>シリコン</td> <td>≤ 1</td> <td>7440-21-3</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>・マンガン、ニッケル及びクロムはP R T R法：第1種指定化学物質に該当</li> </ul>				SUS 304 (線材)			成分名	質量%	CAS No.	鉄	66.5 ~ 74	7439-89-6	マンガン	≤ 2	7439-96-5	ニッケル	8 ~ 10.5	7440-02-0	クロム	18 ~ 20	7440-47-3	シリコン	≤ 1	7440-21-3
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<b>3. 危険・有害性の要約</b> <ul style="list-style-type: none"> <li>・分類の名称：分類基準に該当しない。  製品のままでは、爆発性、引火性、自然発火性、禁水性、酸化性、急性毒性、腐食・刺激性は有りません。</li> <li>・危険有害性コメント：長期の接触により金属アレルギーを生ずる場合がある。</li> </ul>																								
<b>4. 応急処置</b> <ul style="list-style-type: none"> <li>・眼に入った場合 : 線が刺さった場合、線の加工片又は加工粉が入った場合、直ちに線、加工片又は加工粉を取り除き、医師の診断を受けること。</li> <li>・飲み込んだ場合 : 線の加工片又は加工粉を飲み込んだ場合、直ちに医師の診断を受けること。  ・皮膚に刺さった場合：線、線の加工片又は加工粉が刺さった場合、直ちに線、線の加工片又は加工粉を取り除き、外観に変化が見られたり、痛みがある場合は医師の診断を受けること。</li> </ul>																								
<b>5. 火災時の処置</b> <ul style="list-style-type: none"> <li>・ステンレス鋼は不燃性ですが、包装資材は可燃性です。</li> <li>・使用可能消火剤：特に指定なし。</li> <li>・消火方法：消火作業は一般火災に準じておこない、必ず適切な保護具を使用する。</li> </ul>																								

登録番号	MSDS 304	頁	2/2
製品名称	ステンレス鋼線 SUS 304		
6. 漏出時の処置			
・ 漏出はない。			
7. 取扱い及び保管上の注意			
・ 取扱上の注意 : 線の端末は不用意な取扱で皮膚に刺さる危険がある。特に線の結束バンドの切断および端末を引き出す時は線のはねやもつれを起こさないよう注意深く取り扱うこと。			
・ 保管上の注意 : 転倒、転落しないよう注意する。			
8. 暴露防止及び保護措置			
・ 保護措置 : 線端は、必要に応じて手袋、メガネ等保護具を使用すること。			
9. 物理的及び化学的性質			
・ 状態 : 固体(線材)			
・ 色 : 銀白色			
・ 臭気 : 無し			
・ 密度 : 7.93g/cm <sup>3</sup>			
・ 融点 : 1398~1454℃			
・ 溶解性 : 無し			
10. 安定性及び反応性			
・ 安定性 : 還元性の酸などの化学物質、使用環境によっては十分な耐食性を保有していない。			
・ 反応性 : 酸などと反応して有害なガスが発生する場合がある。			
11. 有害性情報			
・ 特に情報を有していない。			
12. 環境影響情報			
・ 特に情報を有していない。			
13. 廃棄上の注意			
・ 廃棄物は産業廃棄物に該当するため、廃棄物処理基準に従う。			
14. 輸送上の注意			
・ 共通 : 「取扱い及び保管上の注意」の項の一般的注意に従う。			
・ 陸上輸送 : 法規に該当しない。			
・ 海上輸送 : 「船舶安全法」に定めるところに従う。			
・ 航空輸送 : 「航空法」に定めるところに従う。			
15. 適用法令			
・ 主な法令に該当しない。			
16. その他の情報			
記載内容は現時点で入手できる資料、情報、データ等にもとづいていますが、危険・有害性の評価は必ずしも十分ではありませんので、取扱には十分注意して下さい。			

(株) シンエイ・ハテック



SEQR-05-E044

Declaration of Conformity to EU-RoHS-Directive

NAS STAINLESS STEEL STRIP MFG. CO., LTD.

We declare that our products have no intentional additives of specific hazardous substances in EU-RoHS-Directive.

Accordingly, Cadmium, Lead, Mercury, Hexavalent Chromium, PBBs, PBDEs do not exist in our products.

The result of analysis is as follows.

Substances	Contents	Result of analysis	Method of analysis	The lower limit of quantitative analysis
Cadmium and Cadmium Compounds	not existent	< 1ppm	Atomic Absorption Spectrometry	< 1ppm
Lead and Lead Compounds	not existent	< 10ppm		< 10ppm
Mercury and Mercury Compounds	not existent	< 1ppm		< 1ppm
Hexavalent Chromium Compounds	not existent	not exist on production process		
Polybrominated Biphenyls (PBBs)	not existent	not exist due to our production is metal		
Polybrominated Diphenyl ethers (PBDEs)	not existent	not exist due to our production is metal		

Sample No. SUS 301, SUS 304

Date

14-Jul-06

Signature

*Teruhiko Naigeshi*

Title

Environmental Management representative

Contact Point

Shiga Plant, Production Management Dept.  
Phone : 0748(75)2326  
Fax : 0748(75)1722

SQAR03-092A (1/2)

## 製品安全データシート

## 製造者情報

- ・会社名 : ナス鋼管株式会社 徳賀工場
- ・住所 : 滋賀県湖南市小砂町4番
- ・担当部門 : 品質保証課  
電話番号 0748-75-2326  
FAX 番号 0748-75-2494
- ・部門責任者 : 品質保証課長 末政洋道
- ・作成日 : 2006年01月23日

## 製品の特定

- ・製品名称 : 冷間圧延ステンレス鋼

## 物質の特定

成分名	重量(%)	CAS No.
鉄 [Fe]	残量	7439-89-6
マンガン [Mn]	0~15	7439-96-5
シリコン [Si]	0~3	7440-21-3
ニッケル [Ni]	0~45	7440-02-0
クロム [Cr]	10~30	7440-47-3
モリブデン [Mo]	0~10	7439-98-7
銅 [Cu]	0~4	7440-50-8
アルミニウム [Al]	0~4	7429-90-6
チタン [Ti]	0~3	7440-32-6
ニオブ [Nb]	0~2	7440-03-1

主成分以外に炭素、硫黄、リン、窒素等の微量成分を含む。

## 危険・有害性の分類

- ・分類の名称 : 分類基準に該当しない。  
製品のままでは、爆発性、引火性、自然発火性、禁水性、酸化性、急性毒性、腐食・刺激性はありません。
- ・危険有害性コメント : 長期の接触により金属アレルギーを生ずる場合がある。  
また、製品のエッジが鋭利になっている場合があり、素手で触れると切創を負う場合がある。



SGAR03-092A (2/2)

## 火災時の処置

- ・ステンレス鋼は不燃性ですが、包装材は可燃性です。
- ・使用可能消火剤：特に指定なし。
- ・消火方法：消火作業は一般火災に準じて行い、必ず適切な保護具を使用する。

## 取扱、保管上の注意

- ・取扱上の注意：必ず軍手等の保護具を着用して取り扱う。
- ・保管上の注意：転倒、転落しないよう注意する。  
また、ステンレス鋼は通常の環境では腐食しないが、水濡れ等があると錆びる場合があるので、注意する。

## 製品の物理/化学的性質

- ・状態：固体
- ・色：銀白色
- ・臭気：無し
- ・密度：7.7~8.3g/cm<sup>3</sup>
- ・融点：1400~1540℃

## 環境影響情報

- ・該当する製品に使用する梱包部材への下記の物質の総合含有量は、10 ppm以下であることを保証する。  
〔物質名〕 Cd, Cr<sup>6+</sup>, Hg, Pb

## 廃棄上の注意

- ・廃棄物は産業廃棄物に該当するため、廃棄物処理基準に従う。

## 輸送上の注意

- ・共通：「取扱及び保管上の注意」の項の一般的注意に従う。
- ・陸上輸送：法規に該当しない。
- ・海上輸送：「船舶安全法」に定めるところに従う。
- ・航空輸送：「航空法」に定めるところに従う。

## 主な適用法令

- ・主な法令に該当しない。

〔注意〕 上記記載内容は現時点で入手できる資料、情報、データ等に基づいていますが、危険・有害性の評価は必ずしも十分ではありませんので、取扱には十分注意して下さい。

以上



# SOC4物質非含有エビデンス報告書

期日: 2005年7月1日

材料名: 硬鋼線C種 SW-C

部品・材料会社名 鈴木金属工業㈱

部品名: \_\_\_\_\_

部署  
品質保証部

責任者  
飯村富男



負荷物質	分析値	分析方法	定量分析法 の下限値	意図的か 非意図的か (理由)	添付 データ
Pb	<0.001mass%	黒鉛炉原子吸 光分析法	0.001mass%	意図的 非意図的 ( )	照会番号 K502062 「硬鋼線C種SW-C φ3.05元素定量結 果報告書」
Hg	<0.0001mass%	ICP-MS 分析方法	0.0001mass%	意図的 非意図的 ( )	''
Cd	<0.0005mass%	黒鉛炉原子吸 光分析法	0.0005mass%	意図的 非意図的 ( )	''
Cr (6価)	<2.5 × 10 <sup>-4</sup> mass%	ジフェニルカル バジド吸光光度 法	0.5 μg	意図的 非意図的 ( )	''

\* 添付データは硬鋼線C種全般としてφ3.05で代表とさせていただきます。



# 製品安全データシート

## MATERIAL SAFETY DATA SHEET

### 製品者情報:

製造業者: 鈴木金属工業株式会社  
 所在地: 千葉県習志野市東習志野7-5-1  
 担当部門: 品質保証部  
 電話番号: 047-476-3117

作成: 平成17年4月1日

### General information:

Manufacturer's name:  
 Suzuki Metal Industry Co., Ltd.  
 Address: 7-5-1 Higashi-Narashino,  
 Narashino-City, Chiba 275-8577  
 Dept. in charge: Quality Assurance Department  
 Emergency telephone number: 047-476-3117

Date of preparation: 1/4/05

製品名: 硬鋼線  
 記号: SW-C

Trade name: Hard drawn steel wires  
 Symbol: SW-C

化学族: 金属  
 化学名: 鋼

Chemical family: Metals  
 Chemical name: Steel

成分: 鋼種: SWRH82A CAS番号  
 基本金属: Fe(残分) 7439-89-6

Ingredients: Steel type: SWRH82A CAS No.  
 Base Metal: Fe (Balance) 7439-89-6

合金成分	CAS番号
C: 0.79~0.86%	7440-44-0
Si: 0.15~0.35%	7440-21-3
Mn: 0.30~0.60%	7439-96-5
P: 0.030%以下	7723-14-0
S: 0.030%以下	7704-34-9

Alloying Elements	CAS No.
C: 0.79~0.86%	7440-44-0
Si: 0.15~0.35%	7440-21-3
Mn: 0.30~0.60%	7439-96-5
P: 0.030% max.	7723-14-0
S: 0.030% max.	7704-34-9

表面皮膜: 皮膜剤: 石灰  
 潤滑剤: Ca系金属石鹸

Coatings: • Lime coating as carrier lubricants  
 • Calcium stearate type metal soap as drawing lubricants

### 物質的情報:

- 物質の状態: 固体
- 外観および臭い: 金属的灰色、無臭
- 融点/沸点: 適用外

### Physical Data:

- Physical State: Solid
- Appearance and odor: Metallic Gray, Odorless
- Melting point/Boiling point: N/A

### 個人保護情報:

- 呼吸保護: OSHA PELを超えた場合NIOSH/MSHAが承認した塵埃および揮用のマスクを着用すべきである。
- 手、腕、胴体/目、顔の保護: 溶接、燃焼又は研磨等の加工をするとき、適切な保護服/顔面保護具を着用すること。

### Personal protection information

- Respiratory protection:  
 NIOSH/MSHA approved dust and fume respirator should be used if OSHA PEL is exceeded.
- Hands, Arms, body/Eyes, Face protection:  
 Use appropriate protective clothing/face shield when burning or grinding

### 緊急医療手段:

#### 救急療法:

煙及び塵埃の過剰被曝の場合、被曝者に新鮮な空気を吸入させるため、作業を止めること、及び、必要に応じて酸素吸入を行い、かつ医者の処置を待つ。

### Emergency medical procedures

#### First aid:

In case of excessive exposure to fumes or particulates, remove exposed person to fresh air, and if necessary administer oxygen and seek physician's assistance.