CONTACTS, ELECTRICAL, CRIMP

FOR 3401/052 AND /056 CONNECTORS

ESCC Detail Specification No. 3401/058

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ESA/SCC Detail Specification No. 3401/058

SCC

space components
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		P9. Figure 2	: Type Q amended to ∅Q Variants 07, 09, 11 and 13 amended	221221
		P10. Figure 2	: Type Q amended to ∅Q Variants 08, 10, 12 and 14 amended	221221
		P15-16. Table 6	: Editorial corrections	23725

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APPENDICES (Applicable to specific Manufacturers only)

None.

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Contacts, Electrical, Crimp, Gauge 22, 20, 16, 12, 8 and 4 for 3401/052 and /056 Connectors.

These contacts shall be packed separately from the connectors and may be procured either with the connectors or separately.

This specification shall be read in conjunction with:

- ESA/SCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular,
- ESA/SCC Detail Specification No. 3401/052, Connectors, Electrical, Circular, Bayonet Coupling, Scoop-proof, Removable Crimp Contacts, Based on MIL-C-38999 Series I .
- ESA/SCC Detail Specification No. 3401/056, Connectors, Electrical, Circular, Triple-Start Self-Locking Coupling, Scoop-proof, Removable Crimp Contacts, Based on MIL-C-38999 Series III.

the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the different sizes of contacts specified herein, which are also covered by this specification are scheduled in Table 1(a).

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the contacts specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION (FIGURE 1)

Not applicable.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the contacts specified herein are shown in Figure 2.

TABLE 1(a) - TYPE VARIANTS

VAR-IANT	TYPE	MATING END SIZE	CRIMP BARREL SIZE	RATED CUR-RENT	ACCEPT WIRE	MAX WEIGHT	ENGAGEMENT & SEPARATION		CONTACT CAPABILITY				CON-TACT RETENT. FORCE MAX	CONTACT INSERT WITHDR. FORCES MAX	PROBE DAMAGE			OVERSIZE PIN EXCL.		
									TEST PIN DIA mm		WEIGHT				MO-MENT	PROBE DIA mm		FORCE MAX	TEST PIN DIA mm	
							ENGAG. max	SEPAR. min			Pick-up	Drop								
				A	AWG	g	N (1)	N (1)	min	max	g (2)	g (3)	N	N	N.cm	min	max	N	min	max
01	Male	22	22	5.0	22 24 26	0.08	-	-	-	-	-	-	44	44	-	-	-	-	-	-
02	Female					0.26	3.33 2.22	0.19 0.19	0.773 0.749	0.775 0.751	- 19.84	340.2 -	44	44	1.34	0.749	0.774	2.45	0.905	0.907
03	Male	20	20	7.5	20 22 24	0.16	-	-	-	-	-	-	67	89	-	-	-	-	-	-
04	Female					0.48	5.01 2.22	0.19 0.19	1.039 0.990	1.041 0.993	- 19.84	510.3 -	67	89	5.64	1.003	1.029	3.33	1.180	1.182
05	Male	16	16	13	16 18 20	0.33	-	-	-	-	-	-	111	89	-	-	-	-	-	-
06	Female					0.87	8.34 3.50	0.56 0.56	1.611 1.562	1.613 1.564	- 56.71	850.5 -	111	89	22.56	1.575	1.60	5.49	1.738	1.740
07	Male	12	12	23	12 14	0.68	-	-	-	-	-	-	111	133	-	-	-	-	-	-
08	Female					1.6	8.34 6.34	0.83 0.83	2.411 2.362	2.413 2.364	- 85.05	850.5 -	111	133	22.56	2.375	2.40	8.24	2.550	2.552

NOTES

1. 1st line with maximum diameter test pin; 2nd line with minimum diameter test pin.
2. With minimum diameter test pin and minimum insertion depth of 4mm.
3. With maximum diameter test pin and minimum insertion depth of 4mm.

TABLE 1(a) - TYPE VARIANTS (CONTINUED)

VARIANT	TYPE	MATING END SIZE	CRIMP BARREL SIZE	RATED CURRENT A	ACCEPT WIRE AWG	MAX WEIGHT g	ENGAGEMENT & SEPARATION		CONTACT CAPABILITY				CONTACT RETENT. FORCE MAX N	CONTACT INSERT WITHDR. FORCES MAX N	PROBE DAMAGE			OVERSIZE PIN EXCL.		
									TEST PIN DIA mm		WEIGHT				MOMENT	PROBE DIA mm		FORCE MAX	TEST PIN DIA mm	
							ENGAG. max N (1)	SEPAR. min N (1)	min	max	Pick-up g (2)	Drop g (3)			N.cm	min	max	N	min	max
09	Male	8	8	46	8	3.5	-	-	-	-	-	-	150	150	-	-	-	-	-	-
10	Female				10	5.0	9.9 8.0	1.1 1.1	3.629 3.581	3.632 2.583	- 110	800 -	150	150	50	3.594	3.619	10	4.00	4.01
11	Male	4	4	80	6	6.0	-	-	-	-	-	-	180	190	-	-	-	-	-	-
12	Female				4	7.5	20.4 16.0	2.2 2.2	5.737 5.689	5.740 5.692	- 220	1600 -	180	190	50	5.702	5.727	15	6.10	6.11
13	Male	4	8	46	8	6.5	-	-	-	-	-	-	180	190	-	-	-	-	-	-
14	Female				10	8.0	20.4 16.0	2.2 2.2	5.737 5.689	5.740 5.692	- 220	1600 -	180	190	50	5.702	5.727	15	6.10	6.11

NOTES

1. 1st line with maximum diameter test pin; 2nd line with minimum diameter test pin.
2. With minimum diameter test pin and minimum insertion depth of 4mm.
3. With maximum diameter test pin and minimum insertion depth of 4mm.

TABLE 1(b) - MAXIMUM RATINGS

NO.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNITS
1	Rated current	I_{CR}	See Table 1(a)	A
2	Operating Temperature Range	T_{op}	-65 to +200	°C
3	StorageTemperature Range	T_{stg}	-65 to +200	°C

FIGURE 1 - PARAMETER DERATING INFORMATION

Not applicable.

2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:-

(a) ESA/SCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular.

(b) ESA/SCC Detail Specification No. 3401/052, Connectors, Electrical, Circular, Bayonet Coupling, Scoop-proof, Removable Crimp Contacts, Based on MIL-C-38999 Series I.

(c) ESA/SCC Detail Specification No. 3401/056, Connectors, Electrical, Circular, Triple-Start Self-Locking Coupling, Scoop-proof, Removable Crimp Contacts, Based on MIL-C-38999 Series III.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply.

4. REQUIREMENTS

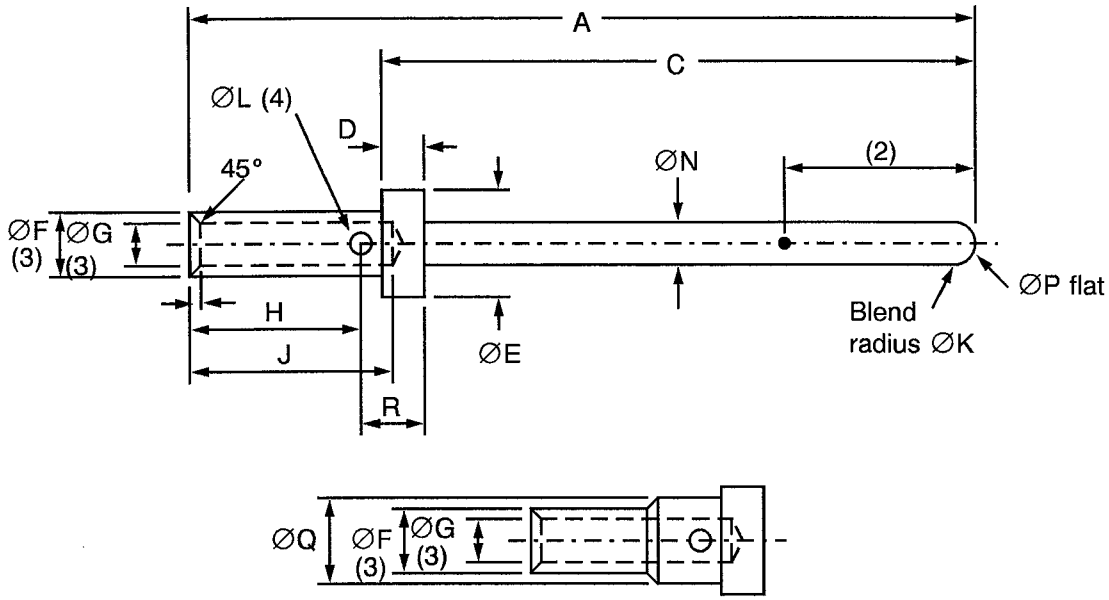
4.1 GENERAL

The complete requirements for procurement of the connectors specified herein are stated in this specification and ESA/SCC Generic Specification No. 3401. Deviations from the Generic Specification applicable to this specification only, are listed in Para 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the components' reliability, are listed in the Appendices attached to this specification.

FIGURE 2 - PHYSICAL DIMENSIONS

VARIANTS WITH UNEVEN NUMBERS - MALE CONTACT



Crimp barrel configuration for Variants 09, 11 and 13

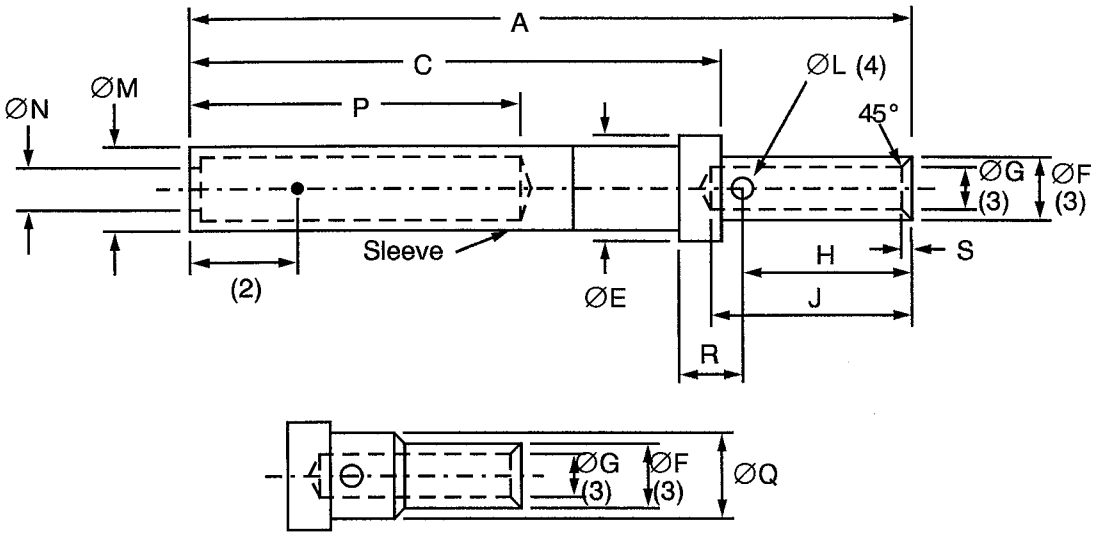
Type Variant		A	C	D	ØE	ØF	ØG	H	J	ØK	ØL	ØN	ØP	ØQ	R	S
01	Min	-	7.49	0.74	1.52	1.17	0.85	3.09	3.58	0.25	0.46	0.75	-	-	-	0.08
	Max	13.64	7.62	0.84	1.57	1.22	0.90	3.27	3.99	0.51	0.56	0.77	0.28	-	-	0.13
03	Min	-	7.49	0.74	2.31	1.73	1.17	-	5.31	0.38	0.66	0.99	-	-	1.82	0.13
	Max	13.64	7.62	0.84	2.39	1.78	1.22	-	5.82	0.64	0.81	1.04	0.38	-	1.98	0.25
05	Min	-	7.49	0.74	3.23	2.57	1.68	-	5.31	0.51	0.91	1.56	0.28	-	2.08	0.13
	Max	13.64	7.62	0.84	3.30	2.62	1.73	-	5.82	0.64	1.07	1.61	0.76	-	2.24	0.25
07	Min	-	7.49	0.74	4.55	3.76	2.49	-	5.31	0.51	0.91	2.36	1.09	-	2.08	0.14
	Max	13.64	7.62	0.84	4.62	3.84	2.59	-	5.82	0.64	1.02	2.41	1.57	-	2.24	0.40
09	Min	-	11.75	0.74	7.69	6.65	4.54	-	12.20	1.80	1.70	3.58	1.50	6.90	2.30	0.40
	Max	26.20	11.95	0.84	7.79	6.73	4.65	-	12.80	1.00	1.85	3.64	2.00	7.00	2.40	0.60
11	Min	-	12.75	0.74	10.50	9.47	7.08	-	12.20	1.00	1.70	5.68	2.00	9.68	2.30	0.40
	Max	26.20	12.95	0.84	10.60	9.55	7.19	-	12.80	1.10	1.85	5.74	2.50	9.80	2.40	0.60
13	Min	-	12.75	0.74	10.50	6.65	4.54	-	14.80	1.00	1.70	5.68	2.00	9.68	2.30	0.40
	Max	28.80	12.95	0.84	10.60	6.73	4.65	-	15.10	1.10	1.85	5.74	2.50	9.80	2.40	0.60

NOTES

1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 4.0±1.0.
3. ØF and ØG to be concentric within 0.05 TIR.
4. Inspection hole shall only penetrate one wall of the crimp barrel.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

VARIANTS WITH EVEN NUMBERS - FEMALE CONTACT



Crimp barrel configuration for Variants 10, 12 and 14

Type Variant		A	C	ØE	ØF	ØG	H	J	ØL	ØM	ØN	P	QØ	R	S
02	Min	-	15.64	1.52	1.17	0.85	3.09	3.58	0.46	-	0.78	4.22	-	-	0.08
	Max	21.92	15.90	1.57	1.22	0.90	3.27	3.99	0.56	1.57	-	-	-	-	0.13
04	Min	-	15.64	2.31	1.73	1.17	-	5.31	0.66	-	1.05	4.22	-	1.82	0.13
	Max	21.92	15.90	2.39	1.78	1.22	-	5.82	0.81	1.98	-	-	-	1.98	0.25
06	Min	-	15.64	3.23	2.57	1.68	-	5.31	0.91	-	1.63	4.22	-	2.08	0.13
	Max	21.92	15.90	3.30	2.62	1.73	-	5.82	1.02	2.87	-	-	-	2.24	0.25
08	Min	-	15.64	4.55	3.76	2.49	-	5.31	0.91	-	2.42	4.22	-	2.08	0.14
	Max	21.92	15.90	4.62	3.84	2.59	-	5.82	1.02	4.09	-	-	-	2.24	0.40
10	Min	-	16.40	7.00	6.65	4.54	-	12.20	1.70	-	3.85	13.10	6.90	2.30	0.40
	Max	30.00	16.75	7.10	6.73	4.65	-	12.80	1.85	6.53	-	-	7.00	2.40	0.60
12	Min	-	16.40	9.00	9.47	7.08	-	12.20	1.70	-	5.95	13.10	9.68	2.30	0.40
	Max	30.00	16.75	9.10	9.55	7.19	-	12.80	1.85	8.54	-	-	9.80	2.40	0.60
14	Min	-	16.40	9.00	6.65	4.54	-	14.80	1.70	-	5.95	13.10	9.68	2.30	0.40
	Max	32.60	16.75	9.10	6.73	4.65	-	15.10	1.85	8.54	-	-	9.80	2.40	0.60

NOTES

1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 2.0±1.0.
3. ØF and ØG to be concentric within 0.05 TIR.
4. Inspection hole shall only penetrate one wall of the crimp barrel.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

None.

4.2.2 Deviations from Final Production Tests (Chart II)

None.

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

Not applicable.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.31, Solderability: Not applicable.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.31, Solderability: Not applicable.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the contacts specified herein shall be verified in accordance with the requirements set out in Para 9.6 of ESA/SCC Generic Specification No. 3401 and shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

The maximum weight of the contacts specified herein shall be as specified in Table 1(a).

4.3.3 Contact Capability

For the purpose of this test, the pick-up and drop weights shall be as specified in Table 1(a).

4.3.4 Contact Retention (in insert)

The contact retention force shall be as specified in Table 1(a).

4.3.5 Mating and Unmating Forces

As specified in ESA/SCC Detail Specification No. 3401/052 or /056.

4.3.6 Insert Retention (In Shell)

As specified in ESA/SCC Detail Specification No. 3401/052 or /056.

4.3.7 Jackscrew Retention

As specified in ESA/SCC Detail Specification No. 3401/052 or /056.

4.3.8 Contact Insertion and Withdrawal Forces

The contact insertion and withdrawal forces shall be as specified in Table 1(a).

4.3.9 Engagement and Separation Forces

The diameter of the test pin and the contact engagement and separation forces of the female contacts shall be as specified in Table 1(a).

4.3.10 Oversize Pin Exclusion

The diameter of the test pin and the force applied to it shall be as specified in Table 1(a).

4.3.11 Probe Damage

The probe diameter and the moment at the end of the probe shall be as specified in Table 1(a).

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the connectors specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Shell, Coupling Ring and Nuts

As specified in ESA/SCC Detail Specification No. 3401/052 or 3401/056.

4.4.2 Inserts

As specified in ESA/SCC Detail Specification No. 3401/052 or 3401/056.

4.4.3 Contacts

The contact body shall be made of copper base alloy selected from raw materials with a minimum of impurities. It shall be plated as follows:-

- 2µm ± 20% nickel underplate.
- 1.27µm minimum gold plate.

4.4.4 Contact Retaining Clip

As specified in ESA/SCC Detail Specification No. 3401/052 or 3401/056.

4.4.5 Guiding and Locking Devices

Not applicable.

4.4.6 Magnetism Level

As specified in ESA/SCC Detail Specification No. 3401/052 or 3401/056.

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following paragraphs.

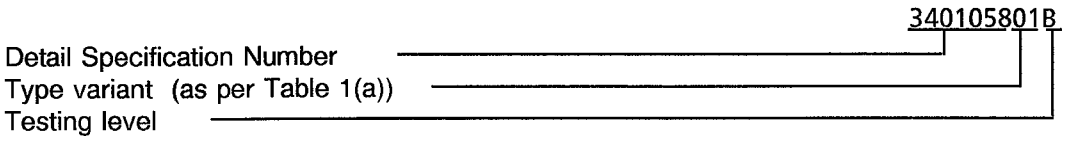
These components being too small to accommodate the marking as specified hereafter, the full marking information shall accompany each lot of components in its primary package. Such marking shall comprise:-

(a) The SCC Component Number.

(b) Traceability information.

4.5.2 The SCC Component Number

The SCC component number shall be constituted and marked as follows:-



4.5.3 Traceability Information

Traceability information shall be marked in accordance with ESA/SCC Basic Specification No.21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. Unless otherwise specified these measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.6.2 Electrical Measurements at High and Low Temperatures (Table 3)

Not applicable.

4.6.3 Circuit for Electrical Measurements (Figure 4)

Not applicable.

4.7 BURN-IN TESTS (TABLES 4 AND 5)

Not applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

NO	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	VARIANTS	LIMITS		UNIT
						MIN	MAX	
1	Contact Resistance (Low Level Current)	Rcl	ESA/SCC No. 3401 Para 9.1.1.3	Para 9.1.1.3	All	-	8.0	mΩ
2	Contact Resistance (Rated Current)	Rcr	ESA/SCC No. 3401 Para 9.1.1.3	Para 9.1.1.3				
				5A	01, 02	-	14	mΩ
				7.5A	03, 04	-	7.0	mΩ
				13A	05, 06	-	4.0	mΩ
				23A	07, 08	-	3.5	mΩ
				46A	03,10, 13, 14	-	3.0	mΩ
				80A	11, 12	-	2.5	mΩ

TABLES 3, 4 AND 5

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS

4.8.1 Measurements and Inspections on Completion of Environmental Tests

The parameters to be measured and inspections to be performed on completion of environmental testing are scheduled in Table 6.

Unless otherwise specified, these measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests.

Not applicable.

4.8.3 Measurements and Inspections on Completion of Endurance Tests

The parameters to be measured and inspections to be performed on completion of endurance tests shall be those specified in Table 6. Unless otherwise specified, these measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.4 Conditions for Operating Life Test (Part of Endurance Testing)

Not applicable.

4.8.5 Electrical Circuits for Operating Life Test

Not applicable.

4.8.6 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in Section 9 of ESA/SCC Generic Specification No. 3401. The conditions for high temperature storage testing shall be the maximum storage temperature specified in Table 1(b) of this specification.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTS

NO.	ESA/SCC GENERIC NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN	MAX	
01	Wiring	Para. 9.10 & Table 1(a) of this spec.	Low Level Contact Resistance	Table 2 Item 1	Rcl	Table 2 Item 1		
02	Vibration	Para. 9.11	ESA/SCC 3401/052 or 3401/056					
03	Shock or Bump	Para. 9.12	ESA/SCC 3401/052 or 3401/056					
04	Climatic Sequence	Para. 9.13	ESA/SCC 3401/052 or 3401/056					
05	Seal Test	Para. 9.9	ESA/SCC 3401/052 or 3401/056					
06	Plating Thickness	Para. 9.14	Thickness	-	-	Para. 4.4.3 of this spec		
07	Joint Strength	Para. 9.15	ESA/SCC 3401 Para 9.15					
08	Rapid Change of Temperature	Para. 9.16	ESA/SCC 3401/052 or 3401/056					
09	Contact Retention (in insert)	Para. 9.17 & Para. 4.3.4 of this spec.	Contact Displacement		-	ESA/SCC 3401 Para. 9.17		
10	Endurance	Para. 9.18	**Initial** Low Level Contact Resist **Final** Low Level Contact Resistance Drift	 Table 2 Item 1 Table 2 Item 1	 Rcl ΔRcl	 Record Values -	 3.0	 mΩ
11	Permanence of Marking	Para. 9.19	As applicable					
12	Mating/Unmating Forces	Para. 9.20	ESA/SCC 3401/052 or 3401/056					
13	High Temperature Storage	Para. 9.21	**Initial** Low Level Contact Resist **Final** Low Level Contact Resistance Drift Rated Current Contact Resistance Contact Retention (in insert)	 Table 2 Item 1 Table 2 Item 1 Table 2 Item 2 Para. 4.3.4 of this spec.	 Rcl ΔRcl Rcr -	 Record Values - Table 2 Item 2 ESA/SCC 3401 Para. 9.17	 3.0	 mΩ
14	Corrosion	Para. 9.22	Visual Examination					

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTS (CONTINUED)

NO.	ESA/SCC GENERIC NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN	MAX	
15	Insert Retention (in shell)	Para. 9.23 & Para. 4.3.6 of this spec.	ESA/SCC 3401/052 or 3401/056					
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	ESA/SCC 3401/052 or 3401/056					
17	High Temperature Measurements	Para. 9.25	ESA/SCC 3401/052 or 3401/056					
18	Overload Test	Para. 9.26	Rated Current Contact Resistance	Table 2 Item 2	Rcr	Table 2 Item 2		
19	Maintenance Aging	Para. 9.27	Visual Examination Contact Retention Contact Insertion & Withdrawal Forces	- Para. 4.3.4 of this spec. Para. 4.3.8 of this spec.	- - -	- ESA/SCC 3401 Para.9.17 Para. 4.3.	-	
20	Engage/Separation Forces	Para. 9.28 & Para. 4.3.9 of this spec.	Force		-	Para. 4.3.9		
21	Oversize Pin Exclusion	Para. 9.29 & Para. 4.3.10 of this spec.			-	ESA/SCC 3401 Para.9.29		
22	Probe Damage	Para. 9.30 & Para. 4.3.11 of this spec.	Contact Separation Force	Para. 4.3.9 of this spec.	-	Para. 4.3.9		
23	Solderability	Para. 9.31 & Para. 4.3.12 of this spec.	Not applicable					

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.