CONNECTORS, MINIATURE, ELECTRICAL, CIRCULAR, TRIPLE-START SELF-LOCKING COUPLING, SCOOP-PROOF, HERMETIC RECEPTACLE AND FEEDTHROUGH, BASED ON MIL-C-38999 SERIES III

ESCC Detail Specification No. 3401/057

ISSUE 1

October 2002

Document Custodian: European Space Agency - see https://escies.org

LEGAL DISCLAIMER AND COPYRIGHT

european space agency
agence spatiale européenne

Pages 1 to 23

CONNECTORS, MINIATURE, ELECTRICAL, CIRCULAR, TRIPLE-START SELF-LOCKING COUPLING, SCOOP-PROOF, HERMETIC RECEPTACLE AND FEEDTHROUGH, BASED ON MIL-C-38999 SERIES III

ESA/SCC Detail Specification No. 3401/057

space components
coordination group

Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 2	July 2000		
Revision 'A'	September 2001		

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 1 and incorporates all modifications defined in Revisions 'A' and 'B' to Issue 1 and the changes agreed in the following DCRs:-		
		Cover page	: Title amended	221572
		DCN		None
		Para. 1.1	: First sentence amended and Specification No. 3401/059 entry deleted	221572
		Para. 2	: Item (c) deleted and (d) renumbered as "(c)"	221572
			: New Item (d) added	221572
		Table 1(a)	: Table amended and second part extended	221572
			: Existing Note deleted and new Note added	221572
		Table 1(b)	: No. 1, Service Rating II added	221572
			: No. 2, Contact Sizes 16, 12 and 8 added	221572/ 221577
			: Nos. 6 to 8 deleted	221572
			: Note 2 deleted	221572
		Figure 1	: Service Rating II added	221572
		Figure 2(a)	: Shell Type 77 drawing and table deleted and new drawing and table added	221572
		Figure 2(b)	: High Density Contacts, Note 3 reference added to Title and Note 3 added	221572
			: Standard Contacts, Note 3 reference added to Title and Note 3 added	221572
			: Special Contacts, Existing arrangements deleted and new arrangements added	221572
		Para. 4.2.4	: (d), new deviation added and all subsequent deviations renumbered	221572
		Para. 4.3.3	: Text deleted and "Not applicable" added	221572
		Para. 4.3.4	: Text amended	221572
		Para. 4.3.9	: Text deleted and "Not applicable" added	221572
		Para. 4.3.12	: New paragraph added	221572
		Para. 4.4.1	: Text amended	221572
		Para. 4.4.2	: In the second sentence, insert amended to "inserts"	221572
		Para. 4.4.3	: Text reduced	221572
		Para. 4.5.4.3	: Table amended to include new contact arrangements	221572
		Para. 4.5.4.5	: New sentence added	221572
		Table 2	: No. 2, Service Rating II value added to Conditions	221572
			: No. 4, Test Conditions and Limits amended	221572
			: No. 5, Test Conditions and Limits amended	221572
			: No. 6 and 7, deleted in toto	221572
			: Note 2 amended	221572
			: Notes 3 to 5 deleted	221572
		Table 6	: No. 04, VSWR and Insertion Loss deleted	221572
			: No. 08, VSWR and Insertion Loss deleted	221572
			: No. 09, Identification and Limits amended	221572
			: No. 10, VSWR and Insertion Loss deleted	221572
			: No. 13, VSWR and Insertion Loss deleted	221572
			: No. 18, "(2)" deleted from Characteristics	221572
			: Notes 2 and 3 deleted	221572
'A'	Sept. '01	P1. Cover page		None
		P2. DCN		None
		P6. Table 1(a)	: Shell Type 77H, Maximum Weight values changed	221643
		P16. Para. 4.4.1	: Text amended	221643

TABLE OF CONTENTS

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Connectors, Miniature, Electrical, Circular, Triple-Start Self-Locking Coupling, Scoop-proof, Hermetic Receptacle and Feedthrough, based on MIL-C-38999 Series III.

It shall be read in conjunction with:

- ESA/SCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular.
- ESA/SCC Detail Specification No. 3401/056, 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 RANGE OF COMPONENTS

The different sizes of connectors specified herein, which are also covered by this specification, together with their mechanical characteristics, are given 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 connector savers specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

The applicable derating information for the connectors specified herein is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

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

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. 3401/056, Connectors, Electrical, Circular, Triple-Start Self-Locking Coupling, Scoop-proof, Removable Crimp Contacts, Based on MIL-C-38999 Series III.

(c) MIL-STD-1560, Insert Arrangements for MIL-C-38999 and MIL-C-27599 Electrical Circular Connectors.

(d) MIL-STD-1651, Insert Arrangements for MIL-C-5015, MIL-C-22992 and MIL-C-83723 Electrical Connectors.

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.

TABLE 1(a) - RANGE OF COMPONENTS

SHELL SIZE	MAX. WEIGHT (g) SHELL TYPE				TIGHT. TORQUE FOR MTG NUT RECEPTACLE 07 MAX (Nm)	TIGHT. TORQUE FOR MTG NUT FEEDTHROUGH 77 MAX (Nm)
	00H	01H	07H	77H		
09	25	20	33	90	6.3	11.5
11	35	30	44	115	8.4	15.7
13	42	37	52	140	10.5	16.8
15	48	42	58	160	13.6	17.9
17	57	50	68	200	16.8	20
19	62	55	74	220	18.9	23.1
21	70	63	83	260	21	25.2
23	75	68	85	290	23.1	28.3
25	83	75	92	320	25.2	30.4

SHELL TYPE	CONTACT SIZE	TYPE	MATING END SIZE	SOLDER BUCKET SIZE	ACCEPT WIRE
RECEPTACLE	22D	Male	22	22	22-24-26
	20	Male	20	20	20-22-24
FEEDTHROUGH	22D	Male	22 (1)	N/A	None
	20	Male	20 (1)	N/A	None
	16	Male	16 (1)	N/A	None
	12	Male	12 (1)	N/A	None
	8	Male	8 (1)	N/A	None

NOTES

1. Identical on both sides of feedthrough.

TABLE 1(b) - MAXIMUM RATINGS

NO	CHARACTERISTICS	SYMBOL	MAXIMUM RATING	UNIT
1	Working Voltage (1) (Sea Level) Service rating M Service rating I Service rating II	U_R	 325 450 575	Vrms
2	Rated Current Contact size 22D Contact size 20 Contact size 16 Contact size 12 Contact size 8	I_{CR}	 3.0 5.0 10 17 33	A
3	Operating Temperature Range	T_{op}	−65 to +200	°C
4	Storage Temperature Range	T_{stg}	−65 to +200	°C
5	Tightening Torque for Mounting Nut Shells 07 and 77	T_q	See Table 1(a)	

NOTES

1. See Para. 4.5.4.3.

FIGURE 1 - PARAMETER DERATING INFORMATION

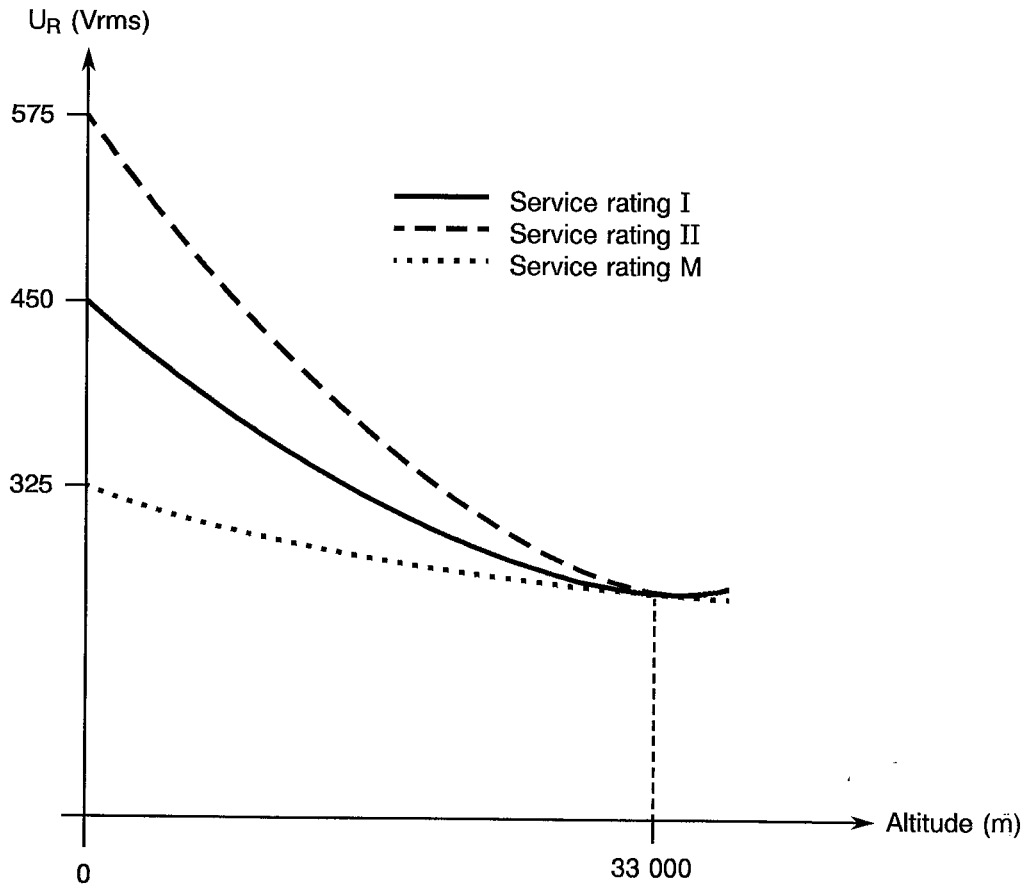
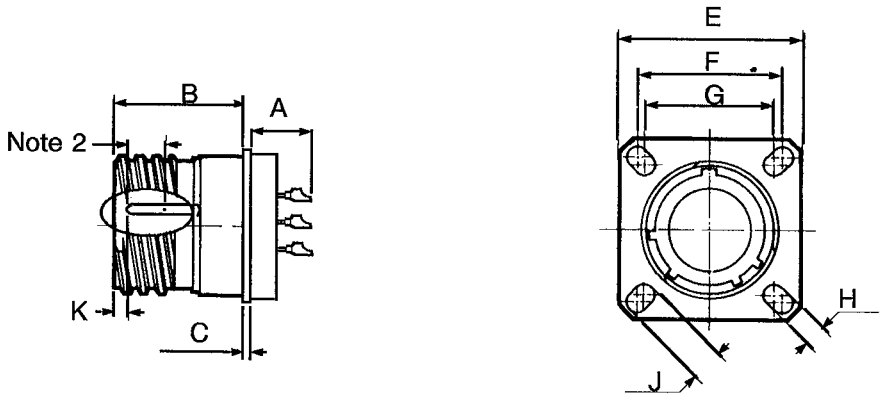


FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(a) - RECEPTACLES

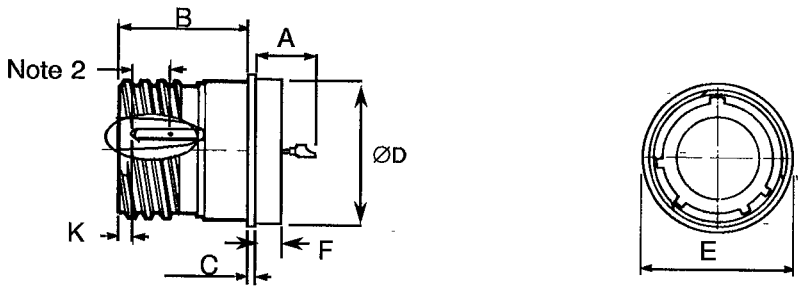
Shell type 00H: Square flange receptacle



SHELL SIZE	09		11		13		15		17		19		21		23		25	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
A	-	5.70	-	5.70	-	5.70	-	5.70	-	5.70	-	5.70	-	5.70	-	5.70	-	5.70
B	-	21.40	-	21.40	-	21.40	-	21.40	-	21.40	-	21.40	-	21.40	-	21.40	-	21.40
C	1.90	2.60	1.90	2.60	1.90	2.60	1.90	2.60	1.90	2.60	1.90	2.60	1.90	2.60	1.90	2.60	1.90	2.60
E	23.50	24.10	25.90	26.50	28.30	28.90	30.70	31.30	33.00	33.60	36.20	36.80	39.40	40.00	42.60	43.20	45.70	46.30
F	18.16	18.36	20.52	20.72	22.91	23.11	24.51	24.71	26.87	27.07	29.26	29.46	31.65	31.85	34.83	35.03	38.00	38.20
G	14.99	15.19	18.16	18.36	20.52	20.72	22.91	23.11	24.51	24.71	26.87	27.07	29.26	29.46	31.65	31.85	34.83	35.03
H	3.05	3.45	3.05	3.45	3.05	3.45	3.05	3.45	3.05	3.45	3.05	3.45	3.05	3.45	3.71	4.11	3.71	4.11
J	5.29	5.69	4.73	5.13	4.73	5.13	4.73	5.13	4.73	5.13	4.73	5.13	4.73	5.13	5.95	6.35	5.95	6.35
K	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54

NOTES
1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 4.0 ± 1.0.

Shell type 01H: Soldermount receptacle



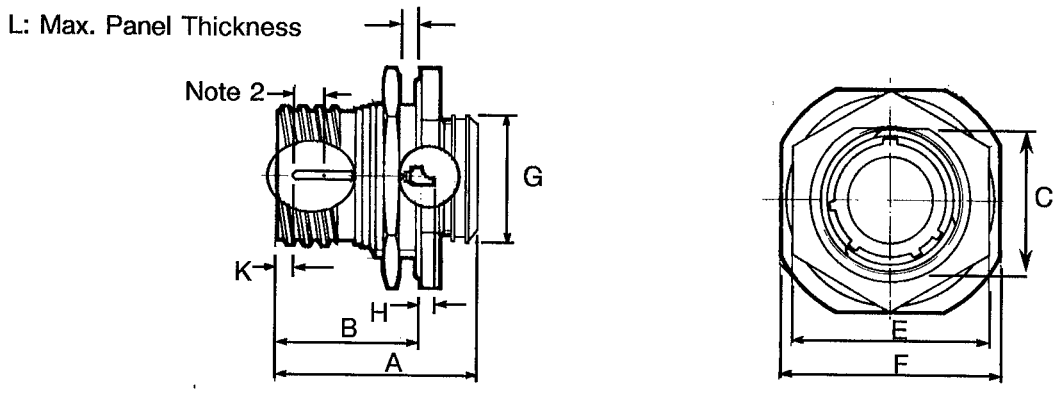
SHELL SIZE	09		11		13		15		17		19		21		23		25	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
A	-	9.70	-	9.70	-	9.70	-	9.70	-	9.70	-	9.70	-	9.70	-	9.70	-	9.70
B	-	17.80	-	17.80	-	17.80	-	17.80	-	17.80	-	17.80	-	17.80	-	17.80	-	17.80
C	0.60	1.20	0.60	1.20	0.60	1.20	0.60	1.20	0.60	1.20	0.60	1.20	0.60	1.20	0.60	1.20	0.60	1.20
ØD	-	17.10	-	19.90	-	23.10	-	26.20	-	29.40	-	31.80	-	35.00	-	38.20	-	41.30
ØE	-	19.40	-	21.80	-	24.90	-	28.10	-	31.30	-	33.60	-	36.80	-	40.00	-	43.20
F	-	5.10	-	5.10	-	5.10	-	5.10	-	5.10	-	5.10	-	5.10	-	5.90	-	5.90
K	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54

NOTES
1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 4.0 ± 1.0.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(a) - RECEPTACLES

Shell type 07H: Single hole mounting receptacle



SHELL SIZE	09		11		13		15		17		19		21		23		25	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
A	-	29.20	-	29.20	-	29.30	-	29.30	-	29.30	-	30.10	-	30.10	-	30.10	-	30.10
B	-	22.60	-	22.60	-	22.60	-	22.60	-	22.60	-	22.60	-	22.60	-	22.60	-	22.60
C	16.38	16.63	18.92	19.17	23.67	23.92	26.82	27.07	30.00	30.25	33.17	33.42	36.35	36.60	39.52	39.77	42.70	42.95
E	-	24.00	-	27.00	-	32.00	-	36.00	-	37.00	-	41.00	-	46.00	-	50.00	-	51.23
F	26.60	27.40	31.40	32.20	34.50	35.30	37.70	38.50	40.90	41.70	45.60	46.40	48.80	49.60	52.00	52.80	55.20	56.00
G	16.10	16.30	19.10	19.40	22.40	22.70	25.60	25.90	28.70	29.00	31.90	32.20	35.10	35.40	38.30	38.60	41.40	41.70
H	-	5.30	-	5.30	-	5.10	-	5.10	-	5.10	-	5.10	-	5.10	-	5.90	-	5.90
K	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54	9.50	10.54
L	1.60	3.20	1.60	3.20	1.60	3.20	1.60	3.20	1.60	3.20	1.60	3.20	1.60	3.20	1.60	3.20	1.60	3.20

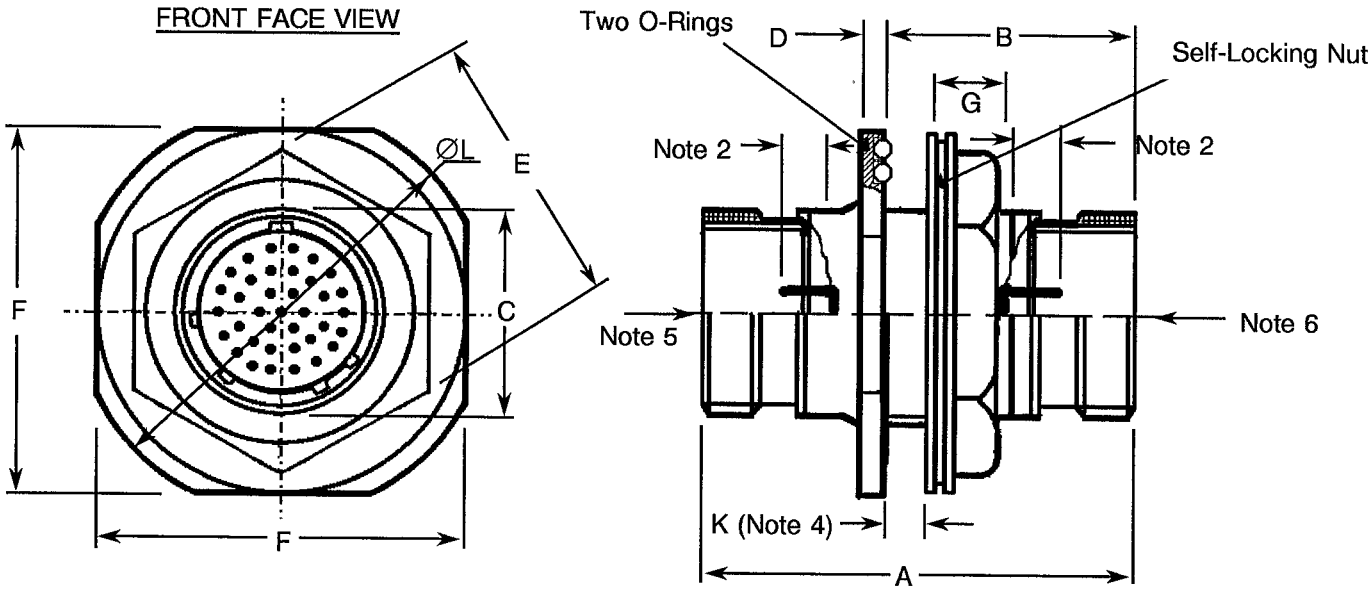
NOTES

1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 4.0 ± 1.0.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(a) - RECEPTACLES

Shell Type 77H: Feedthrough receptacle



SHELL SIZE	09		11		13		15		17		19		21		23		25	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
A	-	52.80	-	52.80	-	52.80	-	52.80	-	52.80	-	52.80	-	52.80	-	52.80	-	52.80
B	-	31.40	-	31.40	-	31.57	-	31.57	-	31.57	-	31.57	-	31.57	-	31.57	-	31.57
C	16.38	16.63	18.92	19.17	23.67	23.92	26.82	27.07	30.00	30.25	33.17	33.42	36.35	36.60	38.52	38.77	42.70	42.95
D	2.50	2.90	2.50	2.90	2.50	2.90	2.50	2.90	2.50	2.90	3.30	3.70	3.30	3.70	3.30	3.70	3.30	3.70
E	22.27	22.50	24.88	25.83	29.77	30.60	32.92	33.76	36.12	37.06	39.27	40.11	42.47	43.31	45.62	46.46	50.56	51.23
F	33.00	33.59	37.85	38.38	41.02	41.55	44.20	44.79	47.37	47.90	50.55	51.09	53.72	54.25	56.90	57.43	60.07	60.50
G	9.90	10.20	9.90	10.20	9.90	10.20	9.90	10.20	9.90	10.20	9.90	10.20	9.90	10.20	9.90	10.20	9.90	10.20
K	1.57	6.35	1.57	6.35	1.57	6.35	1.57	6.35	1.57	6.35	1.57	6.35	1.57	6.35	1.57	6.35	1.57	6.35
ØL	-	36.88	-	41.58	-	44.75	-	47.93	-	51.10	-	54.28	-	57.48	-	60.63	-	63.80

NOTES

1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 4.0 ± 1.0.
3. All other dimensions are in accordance with MIL-C-38999 Series III.
4. Panel Thickness.
5. Plug 66 of ESA/SCC No. 3401/056.
6. Plug 06 of ESA/SCC No. 3401/056.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(b) - HIGH DENSITY CONTACT ARRANGEMENTS - FRONT VIEW MALE INSERT (3)

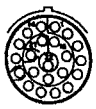
09-35

6 # 22D

11-35

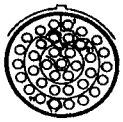
13 # 22D

13-35



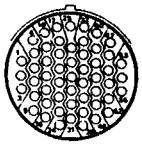
22 # 22D

15-35



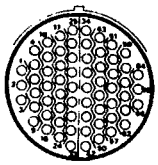
37 # 22D

17-35



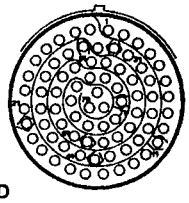
55 # 22D

19-35



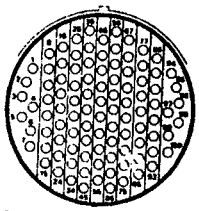
66 # 22D

21-35



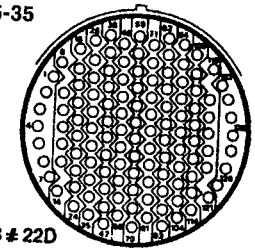
79 # 22D

23-35



100 # 22D

25-35



128 # 22D

NOTES

1. Contact locations and identifications in conformity with MIL-STD-1560.
2. Both sides of the inserts shall be marked.
3. For feedthrough receptacles, the view is from the mounting-nut side.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(b) - STANDARD CONTACT ARRANGEMENTS - FRONT VIEW MALE INSERT (3)

09-98

3 # 20

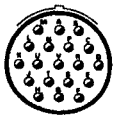
11-98

6 # 20

13-98

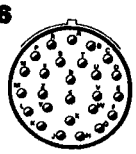
10 # 20

15-19



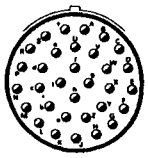
19 # 20

17-26



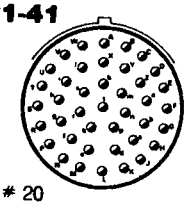
26 # 20

19-32



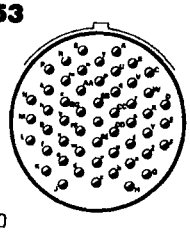
32 # 20

21-41



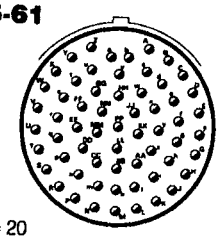
41 # 20

23-53



53 # 20

25-61



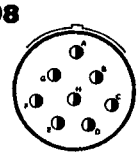
61 # 20

NOTES

1. Contact locations and identifications in conformity with MIL-STD-1560.
2. Both sides of the inserts shall be marked.
3. For feedthrough receptacle, the view is from the mounting-nut side.

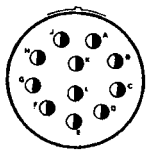
FIGURE 2(b) - SPECIAL CONTACT ARRANGEMENTS - FRONT VIEW MALE INSERT (3)

17-08



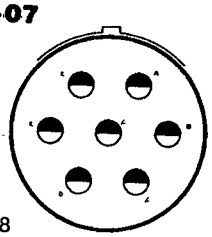
8 # 16

19-11



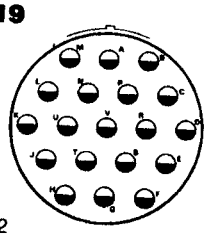
11 # 16

25-07



7 # 8

25-19



19 # 12

◑ *size 16 contacts*

◒ *size 12 contacts*

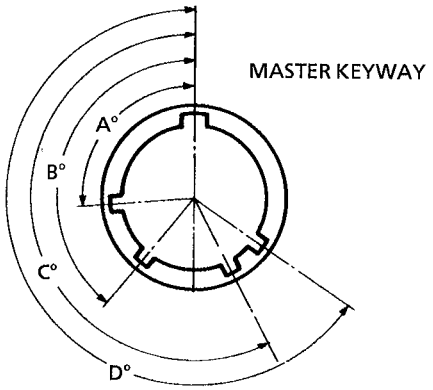
◓ *size 8 contacts*

NOTES

1. Contact locations and identifications in conformity with MIL-STD-1560, except for arrangement 25-07 which is in accordance with MIL-STD-1651.
2. Both sides of the inserts shall be marked.
3. For feedthrough receptables, the view is from the mounting-nut side.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(c) - CLOCKING POSITIONS



Receptacle front end view

NOTES

1. The clocking position is determined by the different angles of the secondary keyways, the insert being always in the same position with respect to the master keyway position which is fixed.

SHELL SIZE	ANGLES	CLOCKING POSITIONS					
		N	A	B	C	D	E
09	A°	105	102	80	35	64	91
	B°	140	132	118	140	155	131
	C°	215	248	230	205	234	197
	D°	265	320	312	275	304	240
11	A°	95	113	90	53	119	51
	B°	141	156	145	156	146	141
	C°	208	182	195	220	176	184
	D°	236	292	252	255	298	242
13	A°	95	113	90	53	119	51
	B°	141	156	145	156	146	141
	C°	208	182	195	220	176	184
	D°	236	292	252	255	298	242
15	A°	95	113	90	53	119	51
	B°	141	156	145	156	146	141
	C°	208	182	195	220	176	184
	D°	236	292	252	255	298	242
17	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
19	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
21	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
23	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272
25	A°	80	135	49	66	62	79
	B°	142	170	169	140	145	153
	C°	196	200	200	200	180	197
	D°	293	310	244	257	280	272

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.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

For the qualification and LAT1 lots, Para. 5.2.4, Plating Thickness, is not applicable.

4.2.2 Deviations from Final Production Tests (Chart II(b))

(a) Para. 9.2, Mating Verification: Shall be performed with 3401/056 plugs.

(b) Para. 9.3, Contact Retainer test: Not applicable.

(c) Para. 9.4, Contact Capability: Not applicable.

(d) Para. 9.5, Residual Magnetism: Not applicable.

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. 9.11.2, Sinusoidal Vibration Testing

- 10-55Hz at 8.25mm double amplitude displacement.
- 56-2000Hz at 50g.
- 1 cycle (10-2000-10 Hz) per axis at a sweep rate of 1 octave per minute.

(b) Para. 9.11.3, Random Vibration Testing

- 20-100Hz at +6dB per octave.
- 100-2000Hz, constant at $1.0g^2/Hz$.
- 3 axes.
- 7 minutes per axis.

(c) Para 9.12.1, Shock: 75g, 11 milliseconds, half sine wave.

(d) Para. 9.15, Joint Strength: Not applicable to feedthrough receptacles Type 77.

(e) Para. 9.24, Jackscrew Retention: Not applicable.

(f) Para. 9.27, Maintenance Ageing: Not applicable.

(g) Para. 9.28, Engagement and Separation Forces: Not applicable.

(h) Para. 9.29, Oversize Pin Exclusion: Not applicable.

(i) Para. 9.30, Probe Damage: Not applicable.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.28, Engagement and Separation Forces: Not applicable.

(b) Para. 9.29, Oversize Pin Exclusion: Not applicable.

(c) Para. 9.30, Probe Damage: Not applicable.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the connectors 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 connectors specified herein shall be as specified in Table 1(a).

4.3.3 Contact Capability

Not applicable.

4.3.4 Contact Retention (In Insert)

The minimum contact retention force shall be 44 Newtons for size 22D contacts, 67 Newtons for size 20 contacts and 100 Newtons for size 16, 12 and 8 contacts.

4.3.5 Mating and Unmating Forces

The forces applied for mating and unmating of the connectors (axial and torque) shall conform to the values specified in Table 1(a) of ESA/SCC Detail Specification No. 3401/056.

4.3.6 Insert Retention (In Shell)

Connector inserts shall withstand a pressure of 70N/cm^2 without being dislodged from the shell.

4.3.7 Jackscrew Retention

Not applicable.

4.3.8 Contact Insertion and Withdrawal Forces

Not applicable.

4.3.9 Engagement and Separation Forces

Not applicable.

4.3.10 Oversize Pin Exclusion

Not applicable.

4.3.11 Probe Damage

Not applicable.

4.3.12 Solderability

Size A soldering iron shall be used. Not applicable to feedthrough receptacle Type 77.

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 and Nuts

Shells and mounting nut shall be made of dull, low reflective, passivated stainless steel.

4.4.2 Insert

The insert shall be made of sintered glass. The interface inserts shall be made of silicone rubber.

4.4.3 Contacts

The contacts shall be made of nickel-iron with nickel underplate and gold finish (minimum thickness: 1.27μm).

4.4.4 Contact Retaining Clip

Not applicable.

4.4.5 Guiding and Locking Devices

Not applicable.

4.4.6 Magnetism Level

Not applicable.

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 subparagraphs. Each component shall be marked in respect of:-

(a) Contact Identification.

(b) The SCC Component Number.

(c) Characteristics.

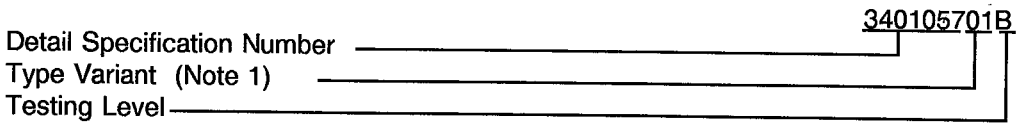
(d) Traceability information.

4.5.2 Contact Identification

Contact identification shall be marked in accordance with Figure 2(b).

4.5.3 The SCC Component Number

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



NOTES 1. Marking of the Type Variant Number is mandatory. No further reference to type variant is made in this specification.

4.5.4 Characteristics

The characteristics to be marked in the following order of precedence are:

(a) Shell type.

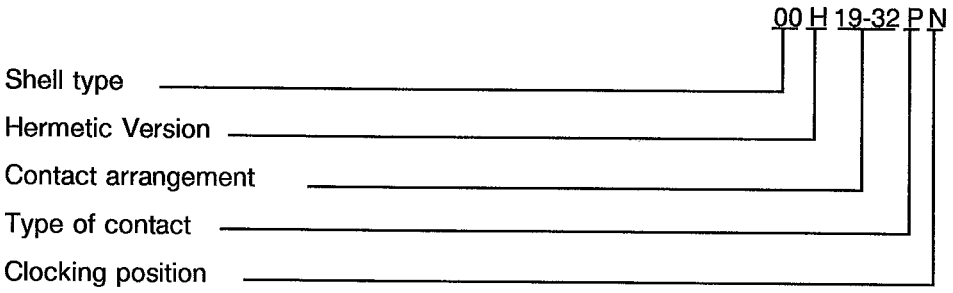
(b) Hermetic version.

(c) Contact arrangement.

(d) Type of contact.

(e) Clocking position.

The information shall be constituted and marked as follows:-



4.5.4.1 Shell Type

The shell type shall be indicated by the numbers specified hereafter:

CODE NO	SHELL TYPE
00	Square flange receptacle
01	Solder mount receptacle
07	Single hole mounting receptacle
77	Feedthrough receptacle

4.5.4.2 Hermetic Version

The hermetic version shall be indicated by the letter "H".

4.5.4.3 Contact Arrangements

The number of contacts shall be as shown in Figure 2(b) and contact arrangements shall be indicated by the codes specified hereafter:

CODE	SERVICE RATING
09-35	M
09-98	I
11-35	M
11-98	I
13-35	M
13-98	I
15-35	M
15-19	I
17-08	II
17-35	M
17-26	I
19-11	II
19-35	M
19-32	I
21-35	M
21-41	I
23-35	M
23-53	I
25-07	I
25-19	I
25-35	M
25-61	I

4.5.4.4 Type of Contact

The contact type shall be indicated by the following code letter:-

CODE LETTER	CONTACT TYPE
P	Male

4.5.4.5 Clocking Position

Clocking positions are as shown in Figure 2(c) and shall be designated by the following code letters: A, B, C, D and E. Code letter N indicates the standard clocking position. For feedthrough receptacle Type 77, the clocking position shall be identical on both sides.

4.5.5 Traceability Information

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

4.5.6 Marking of Small Components

Where it is considered that a component is too small to accommodate the marking as specified above, as much as space permits shall be marked. The order of precedence shall be as specified in Para. 4.5.1. The marking information in full shall accompany each component in its primary package.

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 AND ELECTRICAL MEASUREMENTS (TABLES 4 AND 5)

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION No. 3401)

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 shall be those specified 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 temperature specified in Table 1(b) of this specification.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

NO	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN	MAX	
1	Insulation Resistance	Ri	ESA/SCC No. 3401 Para 9.1.1.1	Para 9.1.1.1	5 000	-	MΩ
2	Voltage Proof Leakage Current Service II Service I Service M	I_L	ESA/SCC No. 3401 Para 9.1.1.2	 2 300Vrms 1 800Vrms 1 300Vrms	-	2.0	mA
3	Mated Shell Conductivity (Voltage Drop)	Vd	ESA/SCC 3401 Para. 9.1.1.4	Para. 9.1.1.4 (Note 1)	Not applicable		mV
4	Contact Resistance (Low Level Current)	Rcl	ESA/SCC No. 3401 Para 9.1.1.3	Para 9.1.1.3 Size 22D Size 20 Size 16 Size 12 Size 8	 - - - - -	(Note 2) 50 25 12 6.0 2.5	mΩ
5	Contact Resistance (Rated Current)	Rcr	ESA/SCC No. 3401 Para 9.1.1.3	Para 9.1.1.3 Size 22D 3.0A Size 20 5.0A Size 16 10A Size 12 17A Size 8 33A	 - - - - -	(Note 2) 60 30 15 8.0 3.0	mΩ

NOTES

1. Applicable to mated connectors with grounding option.
2. With 1 plug on each side of the feedthrough, double the maximum limit.

TABLES 3, 4 AND 5

Not applicable.

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 and Para. 4.2.4 of this spec	**Initial Measurements** Coupling Screw(s) Unlocking Torque **Final Measurements** Full Engagement Coupling Screw(s) Unlocking Torque Drift Visual Examination	 - - -	 - Δ -	 Not applicable Not applicable -	 -	 %
03	Shock or Bump	Para. 9.12 and Para. 4.2.4 of this spec	Full Engagement Visual Examination	- -	- -	- -	- -	
04	Climatic Sequence	Para. 9.13	**Dry Heat** Insulation Resistance Low Air Pressure Volt. Proof Leakage Current **Damp Heat** Insulation Resistance External Visual Inspection Insulation Resistance Voltage Proof leakage Curr.	 Table 2 Item 1 250 Vrms **Immediately after test** Table 2 Item 1 **After 1-24 hrs Recovery** ESA/SCC 3401 Para. 9.7 Table 2 Item 1 Table 2 Item 2	 Ri I_L Ri - Ri I_L	 1 000 Table 2 Item 2 100 ESA/SCC 3401 Para. 9.7 Table 2 Item 1 Table 2 Item 2	 - 	 MΩ MΩ
05	Seal Test	Para. 9.9	ESA/SCC 3401 Para. 9.9			ESA/SCC 3401 Para. 9.9		
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			ESA/SCC 3401 Para. 9.15		
08	Rapid Change of Temperature	Para. 9.16	Visual Examination Insulation Resistance Voltage Proof Leakage Curr.	- Table 2 Item 1 Table 2 Item 2	- Ri I_L	- Table 2 Item 1 Table 2 Item 2	- 	
09	Contact Retention (in insert)	Para. 9.17 & Para. 4.3.4 of this spec.	Contact Retention	-	-	Para. 4.3.4		

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	
10	Endurance	Para. 9.18	**Initial Measurements**					
			Mating/Unmating Forces		F	Para. 4.3.5 of this spec		
			Low Level Contact Resist	Table 2 Item 4	Rcl	Record Values		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Final Measurements					
			Visual Examination	-	-	-	-	-
			Mating/Unmating Forces		F	Para. 4.3.5 of this spec		
			Low Level Contact Resistance Drift	Table 2 Item 4	ΔRcl	-	3.0	mΩ
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Curr.	Table 2 Item 2	I_L	Table 2 Item 2		
11	Permanence of Marking	Para. 9.19	As applicable		-	-	-	
12	Mating/Unmating Forces	Para. 9.20	Force		F	Para. 4.3.5 of this spec		
13	High Temperature Storage	Para. 9.21	**Initial Measurements**					
			Low Level Contact Resis.	Table 2 Item 4	Rcl	Record Values		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Final Measurements					
			Visual Examination	-	-	-	-	-
			Mating/Unmating Forces		F	Para. 4.3.5 of this spec		
			Low Level Contact Resistance Drift	Table 2 Item 4	ΔRcl	-	3.0	mΩ
			Rated Current Contact Resis.	Table 2 Item 5	Rcr	Table 2 Item 5		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Curr.	Table 2 Item 2	I_L	Table 2 Item 2		
			Contact Retention (in insert)	Para. 4.3.4 of this spec.		Para. 4.3.4		
14	Corrosion	Para. 9.22	Visual Examination	-	-	-	-	
15	Insert Retention (in shell)	Para. 9.23 & Para. 4.3.6 of this spec.	Visual Examination	-	-	Para. 4.3.6		
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	Force	-	-	Not applicable		
17	High Temperature Measurements	Para. 9.25	Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ

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	
18	Overload Test	Para. 9.26	Internal Temperature Rated Current Contact Resis. Mated Shell Conductivity Insulation Resistance Voltage Proof Leakage Curr.	 Table 2 Item 5 Table 2 Item 3 Table 2 Item 1 Table 2 Item 2	T Rcr Vd Ri I_L	- Table 2 Item 5 Not applicable Table 2 Item 1 Table 2 Item 2	+100	°C
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.	-	- Not applicable Not applicable	-	
20	Engage/Separation Forces	Para. 9.28 & Para. 4.3.9 of this spec.	Force	-		Not applicable		
21	Oversize Pin Exclusion	Para. 9.29 & Para. 4.3.10 of this spec.	-	-		Not applicable		
22	Probe Damage	Para. 9.30 & Para. 4.3.11 of this spec.	Contact Separation Force	Para. 4.3.9 of this spec		Not applicable		
23	Solderability	Para. 9.31 & Para. 4.3.12 of this spec.	-	-	-	ESA/SCC 3401 Para. 9.31		

NOTES

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