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# **CONTACTS, ELECTRICAL, CRIMP FOR 3401/052 AND /056 CONNECTORS**

**ESCC Detail Specification No. 3401/058**

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433, 435	Specification upissued to incorporate technical and editorial changes per DCR.

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## 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.

The specification shall be read in conjunction with:

- ESCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular.
- ESCC Detail Specification No. 3401/052, Connectors, Electrical, Circular, Bayonet Coupling, Scoop-Proof, Removable Crimp Contacts based on MIL-C-38999 Series I.
- ESCC 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 g	ENGAGEMENT & SEPARATION				CONTACT CAPABILITY				CON- TACT RETENT. FORCE MAX N	CON- TACT INSERT WITHDR. FORCES MAX N	PROBE DAMAGE			OVERSIZE PIN EXCL.			
							ENGAG. max N (1)	SEPAR. min N (1)	TEST PIN DIA.mm min	TEST PIN DIA.mm max	Pick-up g (2)	Drop g (3)	MO- MENT N.cm	PROBE DIA.mm min			PROBE DIA.mm max	FORCE MAX N	TEST PIN DIA mm min	TEST PIN DIA mm max			
01	Male	22	22	5.0	22 24	0.08	-	-	-	-	-	-	-	44	44	-	-	-	-	-	-	-	-
02	Female				26	0.26	3.33 2.22	0.19 0.19	0.775 0.751	-	340.2	-	19.84	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				16 18 20	0.48	5.01 2.22	0.19 0.19	1.039 0.990	1.041 0.993	510.3	-	19.84	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				12 14	0.87	8.34 3.50	0.56 0.56	1.611 1.562	1.613 1.564	850.5	-	56.71	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	850.5	-	85.05	111	133	22.56	2.375	2.40	8.24	2.550	2.552		

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	CON- TACT INSERT WITHDR. FORCES MAX	PROBE DAMAGE		OVERSIZE PIN EXCL.	
							ENGAG. max N (1)	SEPAR. min N (1)	TEST PIN DIA mm	WEIGHT	MO- MENT	PROBE DIA mm	FORCE MAX	TEST PIN DIA mm			min	max		
09	Male	8	8	46	AWG 8 10	3.5	-	-	-	-	-	-	-	111	150	-	-	-	-	
10	Female					5.0	9.9	1.1	3.629	800	-	800	111	150	50	3.594	3.619	10	4.00	4.01
11	Male	4	4	80	6 4	6.0	-	-	-	-	-	-	180	190	-	-	-	-	-	-
12	Female					7.5	20.4	2.2	5.737	1600	-	1600	180	190	50	5.702	5.727	15	6.10	6.11
13	Male	4	8	46	8 10	6.5	-	-	-	-	-	-	180	190	-	-	-	-	-	-
14	Female					8.0	20.4	2.2	5.737	1600	-	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 Rating	Unit
1	Rated Current	I <sub>cr</sub>	See Table 1(a)	A
2	Operating Temperature Range	T <sub>op</sub>	-65 to +200	°C
3	Storage Temperature Range	T <sub>stg</sub>	-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) ESCC Generic Specification No. 3401 for Connectors, Electrical, Non-Filtered, Circular and Rectangular.
- (b) ESCC Detail Specification No. 3401/052, Connectors, Electrical, Circular, Bayonet Coupling, Scoop-Proof, Removable Crimp Contacts based on MIL-C-38999 Series I.
- (c) ESCC 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 ESCC Basic Specification No. 21300 shall apply.

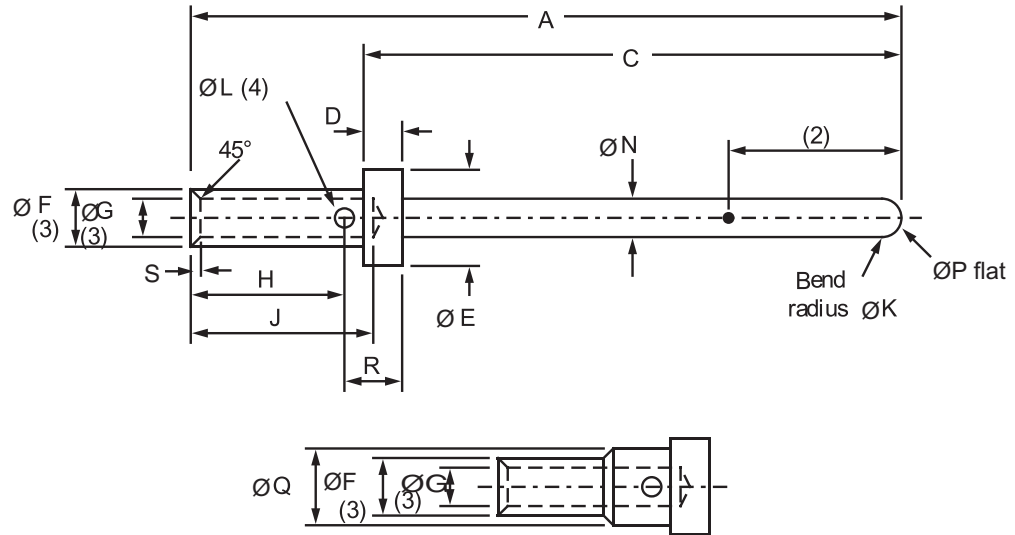
**4. REQUIREMENTS**

**4.1 GENERAL**

The complete requirements for procurement of the contacts specified herein are stated in this specification and ESCC Generic Specification No. 3401. Deviations from the Generic Specification, applicable to this specification only, are detailed 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 ESCC 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



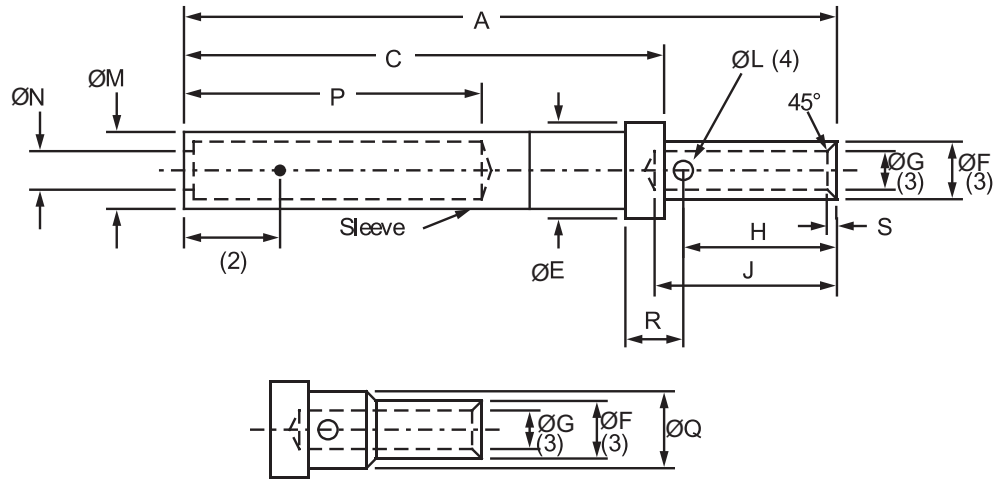
Crimp barrel configuration for Variants 09, 11 and 13

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	0.9	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	2.26	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	0.4
09	Min	-	11.75	0.74	7.69	6.65	4.54	-	12.2	1.8	1.7	3.58	1.5	6.9	2.3	0.4
	Max	26.2	11.95	0.84	7.79	6.73	4.65	-	12.8	1	1.85	3.64	2	7	2.4	0.6
11	Min	-	12.75	0.74	10.5	9.47	7.08	-	12.2	1	1.7	5.68	2	9.68	2.3	0.4
	Max	26.2	12.95	0.84	10.6	9.55	7.19	-	12.8	1.1	1.85	5.74	2.5	9.8	2.4	0.6
13	Min	-	12.75	0.74	10.5	6.65	4.54	-	14.8	1	1.7	5.68	2	9.68	2.3	0.4
	Max	28.8	12.95	0.84	10.6	6.73	4.65	-	15.1	1.1	1.85	5.74	2.5	9.8	2.4	0.6

**NOTES:**

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

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	ØQ	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	15.9	1.57	1.22	0.9	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	15.9	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	15.9	3.3	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	15.9	4.62	3.84	2.59	-	5.82	1.02	4.09	-	-	-	2.24	0.4
10	Min	-	16.4	7.69	6.65	4.54	-	12.2	1.7	-	3.85	13.1	6.9	2.3	0.4
	Max	30	16.75	7.79	6.73	4.65	-	12.8	1.85	6.53	-	-	7	2.4	0.6
12	Min	-	16.4	10.5	9.47	7.08	-	12.2	1.7	-	5.95	13.1	9.68	2.3	0.4
	Max	30	16.75	10.6	9.55	7.19	-	12.8	1.85	8.54	-	-	9.8	2.4	0.6
14	Min	-	16.4	10.5	6.65	4.54	-	14.8	1.7	-	5.95	13.1	9.68	2.3	0.4
	Max	32.6	16.75	10.6	6.73	4.65	-	15.1	1.85	8.54	-	-	9.8	2.4	0.6

**NOTES:**

1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 2±1.
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 ESCC Generic Specification No. 3401 and they 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 given 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 ESCC Detail Specification No. 3401/052 or /056.

4.3.6 Insert Retention (in Shell)

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

4.3.7 Jackscrew Retention

As specified in ESCC 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 contacts 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 ESCC Detail Specification No. 3401/052 or 3401/056.

#### 4.4.2 Inserts

As specified in ESCC 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. The contacts shall be plated as follows:

- 1 $\mu$ m minimum nickel underplate.
- 1.27 $\mu$ m minimum gold plate.

#### 4.4.4 Contact Retaining Clip

As specified in ESCC 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 ESCC 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 ESCC Basic Specification No. 21700 and the following paragraphs. These components being too small to accommodate the marking specified hereafter, the full marking information shall accompany the component in its primary package.

Such marking shall comprise:

- (a) The ESCC Component Number.
- (b) Traceability Information.

4.5.2 The ESCC Component Number

The ESCC Component Number shall be constituted and marked as follows:

340105801B

- Detail Specification Number: 3401058
- Type Variant (See Table 1(a)): 01
- Testing Level: B

4.5.3 Traceability Information

Traceability information shall be marked in accordance with ESCC 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  $T_{amb}=+22\pm 3^{\circ}C$ .

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

Not applicable.

4.6.3 Circuits 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	ESCC 3401 Test Method	Test Conditions	Variants	Limits		Unit
						Min	Max	
1	Contact Resistance (Low Level Current)	Rcl	Para. 9.1.1.3	Para. 9.1.1.3	All	-	8	mΩ
2	Contact Resistance (Rated Current)	Rcr	Para. 9.1.1.3	Para. 9.1.1.3				mΩ
				5A	01, 02	-	14	
				7.5A	03, 04	-	7	
				13A	05, 06	-	4	
				23A	07, 08	-	3.5	
				46A	03, 10, 13, 14	-	3	
				80A	11, 12	-	2.5	

**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 tests are scheduled in Table 6. Unless otherwise specified, the measurements shall be performed at  $T_{amb}=+22\pm3^{\circ}C$ .

**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  $T_{amb}=+22\pm3^{\circ}C$ .

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

Not applicable.

**4.8.5 Electrical Circuit 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 ESCC 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 TESTING**

No.	ESCC Generic Spec. No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Methods 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	ESCC 3401/052 or 3401/056		-	-	-	-
03	Shock or Bump	Para. 9.12	ESCC 3401/052 or 3401/056		-	-	-	-
04	Climatic Sequence	Para. 9.13	ESCC 3401/052 or 3401/056		-	-	-	-
05	Seal Test	Para. 9.9	ESCC 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	ESCC 3401 Para. 9.15	-	-	-	-	-
08	Rapid Change of Temperature	Para. 9.16	ESCC 3401/052 or 3401/056		-	-	-	-

No.	ESCC Generic Spec. No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
09	Contact Retention (in Insert)	Para. 9.17 & Para. 4.3.4 of this spec.	Contact Displacement	-	-	ESCC 3401 Para. 9.17		-
10	Endurance	Para. 9.18	<b>Initial</b> Low Level Contact Resistance	Table 2 Item 1	Rcl	Record Values		-
			<b>Final</b> Low Level Contact Resistance Drift	Table 2 Item 1	ΔRcl	-	3	mΩ
11	Permanence of Marking	Para. 9.19	Not applicable	-	-	-	-	-
12	Mating/Unmating Forces	Para. 9.20	ESCC 3401/052 or 3401/056		-	-	-	-
13	High Temperature Storage	Para. 9.21	<b>Initial</b> Low Level Contact Resistance	Table 2 Item 1	Rcl	Record Values		-
			<b>Final</b> Low Level Contact Resistance Drift	Table 2 Item 1	ΔRcl	-	3	mΩ
			Rated Current Contact Resistance	Table 2 Item 2	Rcr	Table 2 Item 2		-
			Contact Retention (in Insert)	Para. 4.3.4 of this spec.	-	ESCC 3401 Para. 9.17		-
14	Corrosion	Para. 9.22	Visual Examination	-	-	-	-	-
15	Insert Retention (in Shell)	Para. 9.23 & Para. 4.3.6 of this spec.	ESCC 3401/052 or 3401/056		-	-	-	-
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	ESCC 3401/052 or 3401/056		-	Not applicable		-
17	High Temperature Measurements	Para. 9.25	ESCC 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 (in Insert)	Para. 4.3.4 of this spec.	-	ESCC 3401 Para. 9.17		-
			Contact Insertion & Withdrawal Forces	Para. 4.3.8 of this spec.	-	Para. 4.3.8 of this spec		-
20	Engagement and Separation Forces	Para. 9.28 & para. 4.3.9 of this spec.	Force	-	-	Para. 4.3.9 of this spec.		-
21	Oversize Pin Exclusion	Para. 9.29 & para. 4.3.10 of this spec.	-	-	-	ESCC 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 of this spec.		-



No.	ESCC Generic Spec. No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (1)	Test Methods and Conditions	Identification	Conditions		Min	Max	
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.