CONNECTORS, ELECTRICAL, SOLAR ARRAY WITH REMOVABLE CRIMP CONTACTS

BASED ON TYPE D-PASO

ESCC Detail Specification No. 3401/073

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DOCUMENTATION CHANGE NOTICE

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DCR No.	CHANGE DESCRIPTION
859	Specification upissued to incorporate 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 Connectors, Electrical, Solar Array with Removable Crimp Contacts, based on type D-PASO. The specification shall be read in conjunction with:

- ESCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered Circular and Rectangular.
- ESCC Detail Specification No. 3401/074, Contacts, Electrical, Crimp for 3401/073 Solar Array Connectors.
- ESCC Detail Specification No. 3401/075, Accessories for 3401/073 Solar Array Connectors.

the requirements of which are supplemented herein.

1.2 TYPE VARIANTS

Variants of the basic connector covered by this specification 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 connectors specified herein, are as 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.

TABLE 1(a) - TYPE VARIANTS

Variant	Component Type	Description	Weight Max. (g)
01	D-PASO	20 Way Receptacle Connector	8.8 (1)
02	D-PASO	20 Way Plug Connector	9.8 (1)

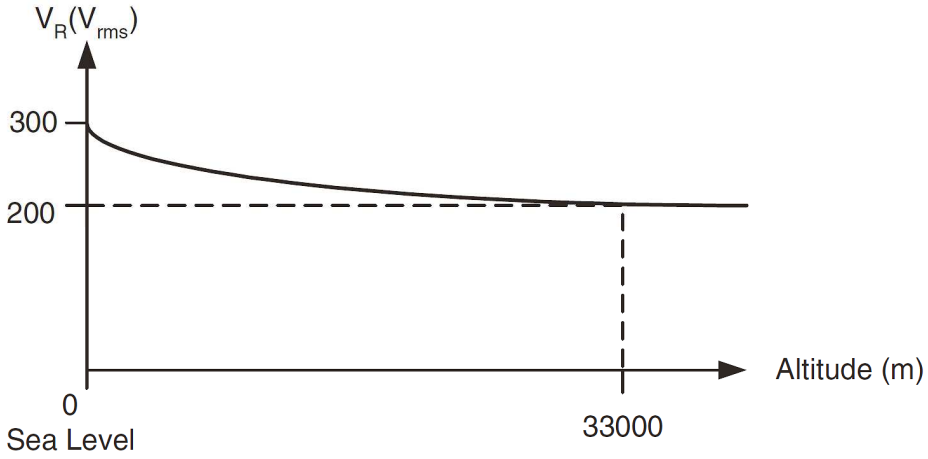
NOTES:

1. Weight without contacts (see ESCC Detail Specification No. 3401/074 for the crimp contact weights).

TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristics	Symbol	Maximum Rating	Unit	Notes
1	Working Voltage	V_R	300	Vrms	At Sea Level, derating per Figure 1.
2	Rated Current (contacts)	I_{CR}	7.5	A	Contact Size AWG 20
3	Operating Temperature Range	T_{op}	-175 to +130	°C	
4	Storage Temperature Range	T_{stg}	-196 to +170	°C	

FIGURE 1 - PARAMETER DERATING INFORMATION

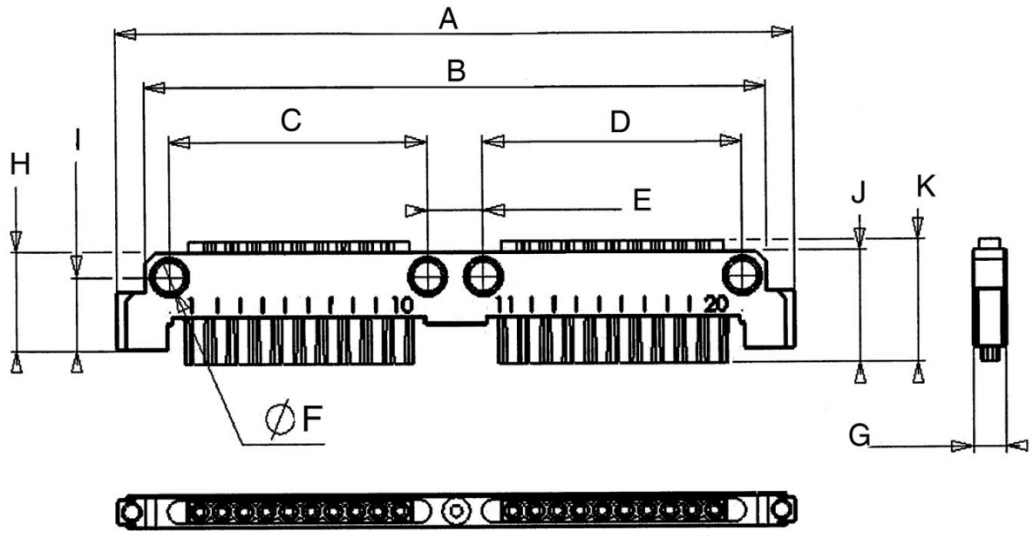


Working Voltage versus Altitude

FIGURE 2 - PHYSICAL DIMENSIONS

Consolidated Notes are at the end of Figure 2.

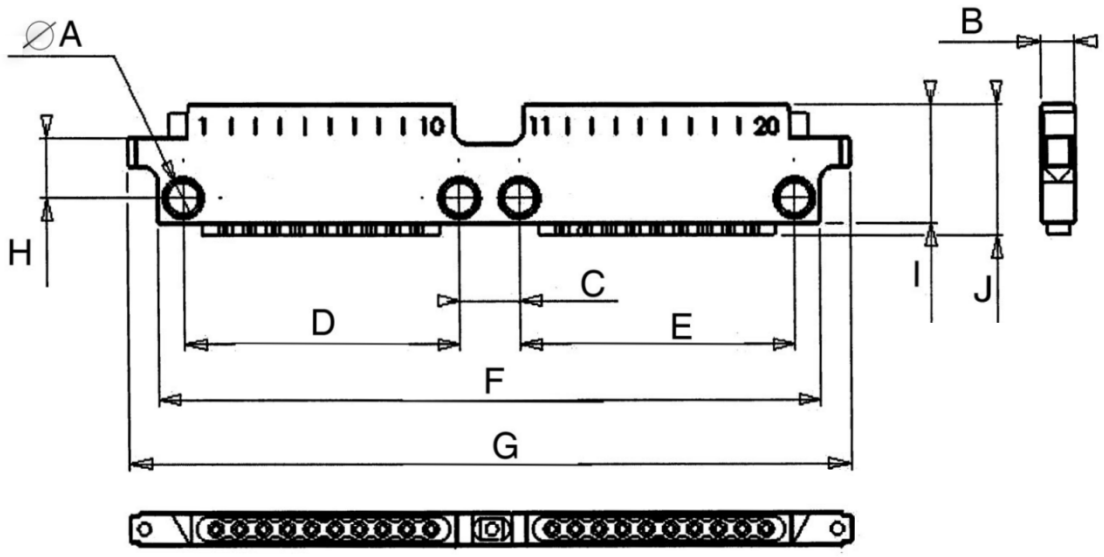
FIGURE 2(a) - RECEPTACLE CONNECTOR - VARIANT 01 (NOTE 2)



CONTACT ARRANGEMENT – 20 female size AWG 20 contacts

Symbols	Dimensions mm		Notes
	Min	Max	
A	96.8	97.2	
B	88.8	89.2	
C	36.9	37.1	
D	36.9	37.1	
E	7.9	8.1	
ØF	4.1	4.2	1
G	4.5	4.7	
H	13.9	14.1	
I	10.4	10.5	
J	15.75	16.15	
K	17.2	17.6	

FIGURE 2(b) - PLUG CONNECTOR - VARIANT 02 (NOTE 2)



CONTACT ARRANGEMENT – 20 male size AWG 20 contacts

Symbols	Dimensions mm		Notes
	Min	Max	
ØA	4.1	4.2	1
B	4.5	4.7	
C	7.9	8.1	
D	36.9	37.1	
E	36.9	37.1	
F	88.8	89.2	
G	96.8	97.2	
H	8	8.1	
I	15.75	16.15	
J	17.3	17.7	

CONSOLIDATED NOTES FOR FIGURE 2

1. Four places.
2. Variants 01 and 02 are not supplied with contacts. These must be ordered separately per ESCC Detail Specification No. 3401/074. Contacts must be from the same Manufacturer as the connector in which they are mounted and this shall be verified prior to assembly.

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. 3401/074, Contacts, Electrical, Crimp for 3401/073 Solar Array Connectors.
(c) ESCC Detail Specification No. 3401/075, Accessories for 3401/073 Solar Array Connectors.

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 connectors 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.

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)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.9, Seal Test: Not applicable.

(b) Para. 9.11.3, Vibration: The Random Vibration Test shall be performed with the following test conditions:

- 3 mutually perpendicular axes with 33.8grms for 6 minutes per axis. The ASD at each frequency is 50Hz/0.2, 100Hz/0.8, 1000Hz/0.8 and 2000Hz/0.2 g^2/Hz.

(c) Para. 9.12, Shock or Bump: Bump test shall be performed.

(d) Para. 9.16, Rapid Change of Temperature: In addition to the specified test, the following shall be performed:

1. 20 Cycles of Rapid Change of Temperature with Vacuum Applied -175 to +130 °C. The vacuum condition is 1 x 10^{-5}mBar.
2. 20 Cycles of Extended Rapid Change in Temperature without Vacuum Applied -175 to +130ºC.
3. 470 Cycles of Extended Rapid Change in Temperature without Vacuum Applied -175 to +95ºC.
4. 800 Cycles of Extended Rapid Change in Temperature without Vacuum Applied -175 to +95ºC.
5. 690 Cycles of Extended Rapid Change in Temperature without Vacuum Applied -175 to +95ºC.

Continuity shall be monitored during all the tests (1) through (5) with no open circuits >1µs allowed. All other test conditions shall be per Para. 9.16(a).

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

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.9, Seal Test: 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 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 connectors specified herein shall be as specified in Table 1(a).

4.3.3 Contact Capability

As specified in ESCC Detail Specification No. 3401/074.

4.3.4 Contact Retention (in insert)

As specified in ESCC Detail Specification No. 3401/074.

4.3.5 Mating and Unmating Forces

The forces applied for mating and unmating of the connectors shall be:

Mating Force - 66N maximum

Unmating Force - 20N minimum, 60N maximum

4.3.6 Insert Retention (in shell)

Connector inserts shall withstand a force of 40N minimum on each insert without being dislodged from the shell.

4.3.7 Jackscrew Retention
Not applicable.

4.3.8 Contact Insertion and Withdrawal Forces
As specified in ESCC Detail Specification No. 3401/074.

4.3.9 Engagement and Separation Forces
As specified in ESCC Detail Specification No. 3401/074.

4.3.10 Oversize Pin Exclusion
As specified in ESCC Detail Specification No. 3401/074.

4.3.11 Probe Damage
As specified in ESCC Detail Specification No. 3401/074.

4.3.12 Solderability
Not applicable.

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 Shells
Shells shall be made of AU2GN-2618 Aluminium Alloy. The plating shall be 1.3µm minimum of gold over 3 to 5µm electroless nickel.

4.4.2 Inserts
Inserts shall be made of high temperature thermoplastic (above +200°C).

4.4.3 Contacts
As specified in ESCC Detail Specification No. 3401/074.

4.4.4 Contact Retaining Clip
The retaining clip shall be made of beryllium copper.

4.4.5 Guiding and Locking Devices
As specified in ESCC Detail Specification No. 3401/075.

4.4.6 Magnetism Level
The completely assembled connector including contacts and accessories shall not exceed a magnetism level of 200 gamma.

4.5 MARKING

4.5.1 General
The marking of components delivered to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and the following paragraphs.

The information to be marked and the order of precedence, shall be as follows:

(a) Contact Identification.
(b) The ESCC Component Number.
(c) Traceability Information.

4.5.2 Contact Identification
Contact identification shall be marked in accordance with Figure 2.

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

Example: 340107301B

- Detail Specification Reference: 3401073
- Type Variant (See Table 1(a)): 01
- Testing Level: B

4.5.4 Traceability Information
Each component shall be marked in respect of traceability information in accordance with the requirements of 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, measurements shall be performed at T_{amb} = +22 ±3 °C.

4.6.2 Electrical Measurements at High and Low Temperatures
Not applicable.

4.6.3 Circuits for Electrical Measurements
Not applicable.

4.7 BURN-IN AND ELECTRICAL MEASUREMENTS
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 stated, the 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 are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at T_{amb} = +22 ±3 ºC.

4.8.4 Conditions for Operating Life (Part of Endurance Testing)
Not applicable.

4.8.5 Electrical Circuit for Operating Life
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 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESCC 3401 Test Method	Test Conditions	Limits		Unit
					Min	Max	
1	Insulation Resistance	Ri	Para 9.1.1.1	1500 Vdc DC Test	5000	-	MΩ
2	Voltage Proof Leakage Current	I_L	Para 9.1.1.2	1000 Vrms Test Duration = 5s AC Test	-	5	mA

TABLES 3, 4 AND 5

Not applicable.

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	ESCC 3401/074	-	-	-	-	
02	Vibration	Para. 9.11	**Initial Measurements**					
			Coupling Screw(s) Unlocking Torque	-	-	Record Values		
			Final Measurements					
			Coupling Screw(s) Unlocking Torque Drift	-	Δ	-25	+25	%
			Visual Examination	-	-	-	-	
03	Bump	Para. 9.12.2	**Initial Measurements**					
			Coupling Screw(s) Unlocking Torque	-	-	Record Values		
			Final Measurements					
			Coupling Screw(s) Unlocking Torque Drift	-	Δ	-25	+25	%
			Visual Examination	-	-	-	-	

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	
04	Climatic Sequence	Para. 9.13	**Dry Heat**					
			Insulation Resistance	Table 2 Item 1 at T_{amb} = +130 °C	Ri	1000	-	MΩ
			Low Air Pressure					
			Voltage Proof Leakage Current	Figure 1	I_L	Table 2 Item 2		
			Damp Heat	Immediately after test				
			Insulation Resistance	Table 2 Item 1	Ri	5000	-	MΩ
				After 1-24 hrs Recovery				
			External Visual Inspection	ESCC 3401 Para. 9.7	-	ESCC 3401 Para. 9.7		
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
05	Seal Test	Para. 9.9	-	-	-	Not applicable		
06	Plating Thickness	Para. 9.14	ESCC 3401/074	-	-	-	-	
07	Joint Strength	Para. 9.15	ESCC 3401/074	-	-	-	-	
08	Rapid Change of Temperature	Para. 9.16	Visual Examination	-	-	-	-	
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
09	Rapid Change of Temperature with Vacuum Applied	Para. 9.16 & Para. 4.2.4(d) of this spec.	**(1) 20 Cycles**					
			Visual Examination	-	-	-	-	
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		

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	
10	Extended Rapid Change of Temperature without Vacuum Applied	Para. 9.16 & Para. 4.2.4(d) of this spec.	**(2) 20 Cycles**					
			Visual Examination	-	-	-	-	
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
			(3) 470 Cycles					
			Visual Examination	-	-	-	-	
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
			(4) 800 Cycles					
			Visual Examination	-	-	-	-	
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
			(5) 690 Cycles					
			Visual Examination	-	-	-	-	
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
11	Contact Retention (in insert)	Para. 9.17 & Para. 4.3.4 of this spec.	Contact Displacement	-	-	ESCC 3401 Para. 9.17		

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	
12	Endurance	Para. 9.18	**Initial Measurements**					
			Mating/Unmating Forces	-	F	Para. 4.3.5 of this spec.		
			Low Level Contact Resistance	ESCC 3401/074	R_{cl}	Record Values		
			Final Measurements					
			Visual Examination	-	-	-	-	
			Mating/Unmating Forces	-	F	Para. 4.3.5 of this spec.		
			Low Level Contact Resistance Drift	ESCC 3401/074	ΔR_{cl}	ESCC 3401/074		
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
13	Permanence of Marking	Para. 9.19	As applicable	-	-	-	-	
14	Mating/Unmating Forces	Para. 9.20	Force	-	F	Para. 4.3.5 of this spec.		
15	High Temperature Storage	Para. 9.21	**Initial Measurements**					
			Low Level Contact Resistance	ESCC 3401/074	R_{cl}	Record Values		
			Final Measurements					
			Visual Examination	-	-	-	-	
			Mating/Unmating Forces	-	F	Para. 4.3.5 of this spec.		
			Low Level Contact Resistance Drift	ESCC 3401/074	ΔR_{cl}	ESCC 3401/074		
			Rated Current Contact Resistance	ESCC 3401/074	R_{cr}	ESCC 3401/074		
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
			Contact Retention (in insert)	Para. 4.3.4 of this spec.	-	ESCC 3401 Para. 9.17		

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	
16	Corrosion	Para. 9.22	Visual Examination	-	-	-	-	
17	Insert Retention (in shell)	Para. 9.23 & Para. 4.3.6 of this spec.	Visual Examination	-	-	Para. 4.3.6 of this specification		
18	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	-	-	-	Not applicable		
19	High Temperature Measurements	Para. 9.25	Insulation Resistance	Table 2 Item 1 at T_{amb} = +130 ^{o}C	Ri	1000	-	MΩ
20	Overload Test	Para. 9.26	Internal Temperature	-	T	-	+100	^{o}C
			Rated Current Contact Resistance	ESCC 3401/074	R_{cr}	ESCC 3401/074		
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2	I_L	Table 2 Item 2		
21	Maintenance Aging	Para. 9.27	Contact Insertion Force	Para. 4.3.8 of this spec.	-	Para. 4.3.8 of this spec.		
			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.		
22	Engagement and Separation Forces	Para. 9.28 & para. 4.3.9 of this spec.	Forces	-	-	Para. 4.3.9 of this spec.		
23	Oversize Pin Exclusion	Para. 9.29 & para. 4.3.10 of this spec.	ESCC 3401/073	-	-	-	-	
24	Probe Damage	Para. 9.30 & para. 4.3.11 of this spec.	ESCC 3401/073	-	-	-	-	
25	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.

APPENDIX 'A'

AGREED DEVIATIONS FOR COMPAGNIE DEUTSCH (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Table 2, Test 1	Insulation Resistance (DC Test) may be performed in accordance with EIA 364.21.
Table 2, Test 2	Voltage Proof Leakage Current (AC Test) may be performed in accordance with EIA 364.20.
Para. 4.2.2	Para. 9.5 Magnetism: May be guaranteed but not tested.