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**CONTACTS, ELECTRICAL, MALE/FEMALE TYPE,  
FOR 3401/020 CONNECTOR SAVERS  
ESCC Detail Specification No. 3401/021**

**ISSUE 2  
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**DOCUMENTATION CHANGE NOTICE**

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432, 452	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, Male/Female Type, Gauge 20 and 22, for 3401/020 Connector Savers.

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

This specification shall be read in conjunction with:

- ESCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular,
- ESCC Detail Specification No. 3401/020, Connector Savers, Electrical, Rectangular, Miniature, Removable Contacts, Based on Type D\*BMA,

the requirements of which are supplemented herein.

### 1.2 COMPONENT TYPE VARIANTS

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.

## 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, Connectors, Electrical, Non-Filtered, Circular and Rectangular.
- (b) ESCC Detail Specification No. 3401/020, Connector Savers, Electrical, Rectangular, Miniature, Removable Contacts, Based on Type D\*BMA.
- (c) MIL-G-45204, Gold Plating, Electro-deposited.
- (d) MIL-C-14550, Copper Plating, Electro-deposited.

## 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.



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**TABLE 1(a) - TYPE VARIANTS**

VAR- IANT	TYPE	MATING END SIZE	RATED CUR- RENT	MAX WEIGHT	ENGAGEMENT & SEPARATION		TEST PINS			CONTACT CAPABILITY			CON- TACT RETENT. FORCE MAX	CON- TACT INSERT WITHDR FORCES MAX	PROBE DAMAGE			OVERSIZE PIN EXCL.	
					ENGAG. FORCES N (1)	SEPAR. FORCES N (1)	DIA mm		Pick-up (2) g	Drop (3) g	MO- MENT N.cm	PROBE DIA mm			FORCE MAX	TEST PIN DIA mm			
							min.	max.				min				max	min	max	
					N (1)	N (1)	min.	max.	min	max	min	max			min	max	min	max	
01	Male/Female	20	7.5	0.25	3.33	2.22	1.039	1.040	-	226.80	40	18.50	5.65	1.007	1.033	3.33	1.166	1.170	
02	Male/Female	22	5.0	0.16	-	0.28	0.990	0.993	28.35	-	40	18.50	1.30	0.749	0.774	2.43	0.905	0.907	
					3.33	2.22	0.773	0.775	-	226.80	40	18.50	1.30	0.749	0.774	2.43	0.905	0.907	
					-	0.20	0.749	0.751	19.84	-									

**NOTES**

- 1st line, maximum values with maximum diameter test pin.
- 2nd line, minimum values with minimum diameter test pin.
- With minimum diameter test pin and minimum insertion depth of 4.0mm.
- With maximum diameter test pin and minimum insertion depth of 4.0mm.



**TABLE 1(b) - MAXIMUM RATINGS**

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATING	UNIT	REMARKS
1	Rated Current	$I_{CR}$	See Table 1(a)	A	
2	Operating Temperature Range	$T_{op}$	- 55 to + 125	°C	$T_{amb}$
3	Storage Temperature Range	$T_{stg}$	- 65 to + 125	°C	

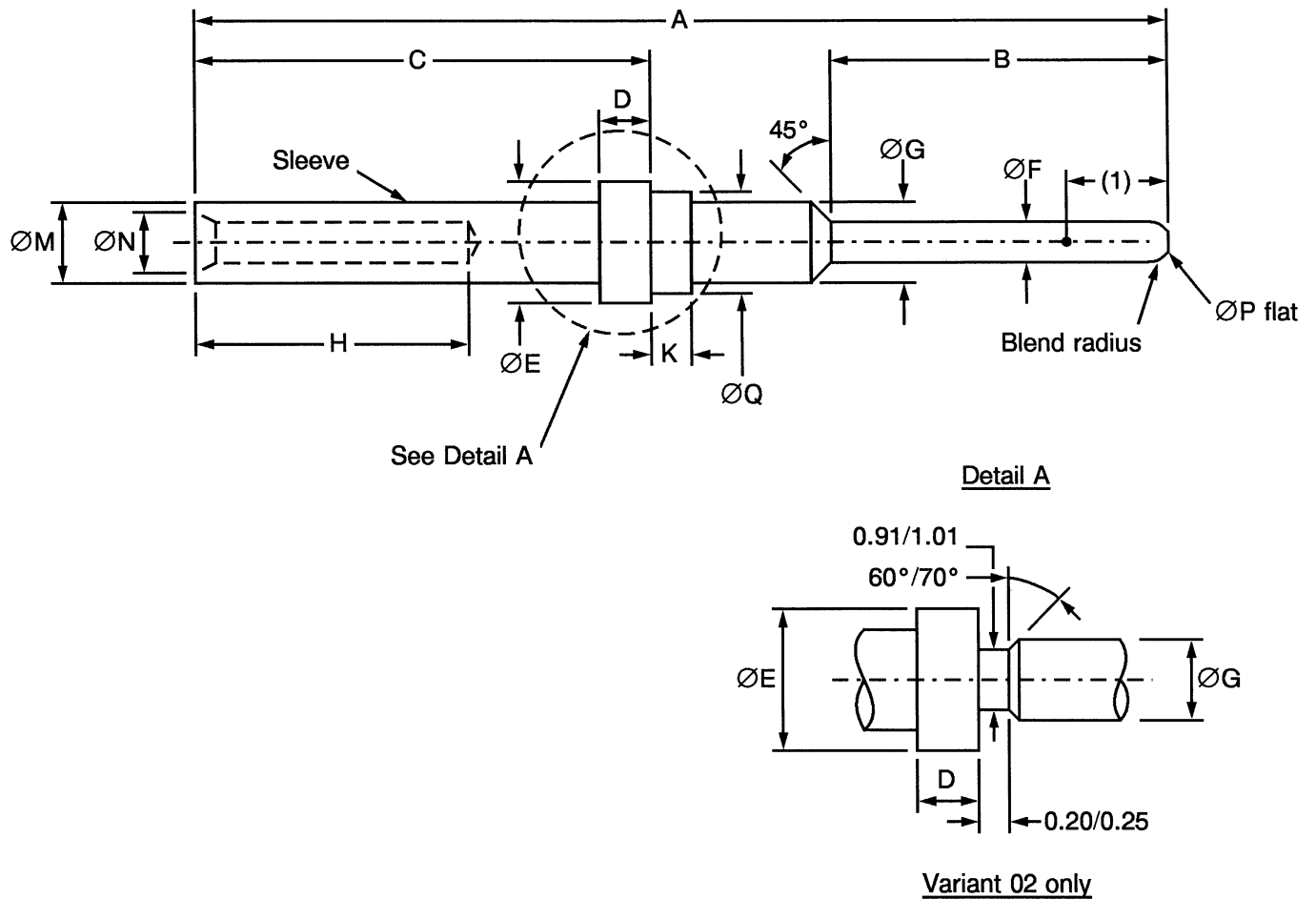
**FIGURE 1 - PARAMETER DERATING INFORMATION**

Not applicable.



**FIGURE 2 - PHYSICAL DIMENSIONS**

**MALE/FEMALE CONTACT - VARIANTS 01 AND 02**



Variant	Dimensions	A	B	C	D	<u>ØE</u>	<u>ØF</u>	ØG	H	K	ØM	ØN	P	ØQ
		01	Min.	19.76	5.27	9.45	0.72	2.08	0.99	1.65	7.00	1.01	1.70	1.07
	Max.	20.12	6.05	9.65	0.86	2.16	1.04	1.73	-	1.25	1.85	1.14	0.30	1.80
02	Min.	19.50	5.95	7.10	0.79	1.52	0.749	1.17	4.22	-	-	0.78	-	-
	Max.	19.95	6.05	7.35	0.89	1.56	0.775	1.21	-	-	1.57	-	0.20	-

**NOTES**

1. Measurement point for plating thickness:  $4.0 \pm 1.0$ .
2. All dimensions are in millimetres (angles in degrees).
3. Underlined dimensions, in Table, are critical to ensure intermateability.

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**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 Detail 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 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)**

Not applicable.

**4.2.4 Deviations from Qualification Tests (Chart IV)**

- (a) Para. 9.10, Wiring: Not applicable.
- (b) Para. 9.15, Joint Strength: Not applicable.
- (c) Para. 9.31, Solderability: Not applicable.

**4.2.5 Deviations from Lot Acceptance Tests (Chart V)**

- (a) Para. 9.10, Wiring: Not applicable.
- (b) Para. 9.15, Joint Strength: Not applicable.
- (c) Para. 9.31, Solderability: Not applicable.

**4.3 MECHANICAL REQUIREMENTS**

**4.3.1 Dimension Check**

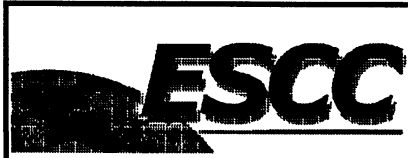
The dimensions of the contacts specified herein shall be verified in accordance with the requirements set out in Para. 9.6 of ESCC Generic Specification No. 3401 and shall conform to those shown in Figure 2 of this specification.

**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 ESCC Detail Specification No. 3401/020.

4.3.6 Insert Retention (in Shell)

As specified in ESCC Detail Specification No. 3401/020.

4.3.7 Jackscrew Retention

Not applicable.

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 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).

4.3.12 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 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 Shells

As specified in ESCC Detail Specification No. 3401/020.

4.4.2 Inserts

As specified in ESCC Detail Specification No. 3401/020.

4.4.3 Contacts

The contact body shall be made of copper alloy with an underplate of 1.0 $\mu$ m minimum of non-magnetic nickel or copper to MIL-C-14450, gold plated with 1.27 $\mu$ m minimum of gold, Type 2 Grade C of MIL-G-45204.

The female contact spring element shall be made of copper alloy with an underplate of 1.0 $\mu$ m minimum of nickel or copper to MIL-C-14450, gold plated with 1.27 $\mu$ m minimum of gold, Type 2 Grade C of MIL-G-45204.

4.4.4 Contact Retaining Clip

As specified in ESCC Detail Specification No. 3401/020.

4.4.5 Guiding and Locking Devices

As specified in ESCC Detail Specification No. 3401/020.

4.4.6 Magnetism Level

As specified in ESCC Detail Specification No. 3401/020.

4.5 MARKING

4.5.1 General

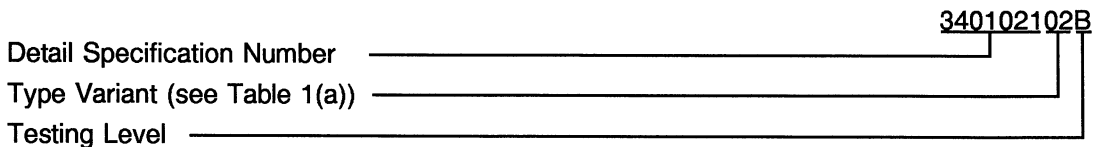
The marking of all components delivered to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

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

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

4.5.2 The ESCC Component Number

Each component shall bear the ESCC Component Number which shall be constituted and marked as follows:



4.5.3 Traceability Information

Traceability information shall be marked 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 these measurements shall be performed at  $T_{amb} = +22 \pm 3$  °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.

**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE**

No.	CHARACTERISTICS	SYMBOL	ESCC 3401 TEST METHOD	TEST CONDITION	VARIANTS	LIMITS		UNIT
						MIN.	MAX.	
1	Contact Resistance (Low Level Current)	Rcl	Para 9.1.1.3	Para 9.1.1.3	01 and 02	-	17	mΩ
2	Contact Resistance (Rated Current)	Rcr	Para 9.1.1.3	Para 9.1.1.3 7.5A 5.0A	01	-	14.7	mΩ
					02	-	16	mΩ

**TABLES 3, 4, 5 AND 6**

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESCC 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 are scheduled in Table 6. Unless otherwise specified, these measurements shall be performed at  $T_{amb} = +22 \pm 3$  °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  $T_{amb} = +22 \pm 3$  °C.

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

Not applicable.

4.8.5 Electrical Circuits for Operating Life Tests (Figure 5)

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 TESTS**

NO.	ESCC GENERIC SPEC. NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Seal Test	Para. 9.9	ESCC 3401/020					
02	Wiring	Para. 9.10	Not applicable					
03	Vibration	Para. 9.11	ESCC 3401/020					
04	Shock or Bump	Para. 9.12	ESCC 3401/020					
05	Climatic Sequence	Para. 9.13	ESCC 3401/020					
06	Plating Thickness	Para. 9.14	Thickness	-	-	Para. 4.4.3 of this spec		
07	Joint Strength	Para. 9.15	Not applicable					
08	Rapid Change of Temperature	Para. 9.16	ESCC 3401/020					
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	Initial Measurements Low Level Contact Resistance	Table 2 Item 1	Rcl	Record Values		
			Final Measurements Low Level Contact Resistance Drift	Table 2 Item 1	ΔRcl	-	3.0	mΩ
11	Permanence of Marking	Para. 9.19	As applicable	-	-	-	-	-
12	Mating/Unmating Forces	Para. 9.20	ESCC 3401/020					
13	High Temperature Storage	Para. 9.21	Initial Measurements Low Level Contact Resistance	Table 2 Item 1	Rcl	Record Values		
			Final Measurements Low Level Contact Resistance Drift	Table 2 Item 1	ΔRcl	-	3.0	mΩ
			Rated Current Contact Resistance Contact Retention (in Insert)	Table 2 Item 2 Para. 4.3.4 of this spec.	Rcr	Table 2 Item 2 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 3401/020					
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	ESCC 3401/020					
17	High Temperature Measurements	Para. 9.25	ESCC 3401/020					
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.		ESCC 3401 Para. 9.17 Para. 4.3.8		
20	Engage/Separation Forces	Para. 9.28 & Para. 4.3.9 of this spec.	Force			Para. 4.3.9		

**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 (CONT'D)**

NO.	ESCC GENERIC SPEC. NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
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		
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.



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**APPENDIX 'A'**

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AGREED DEVIATIONS FOR C&K COMPONENTS (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
<p>Para. 4.2.2, Deviations from Final Production Tests (Chart II)</p>	<p>Para. 9.4, Contact Capability: 100% Contact Capability Test may be omitted provided that a 100% visual inspection of the contact and a 10% Contact Capability test are performed in accordance with the C&amp;K PID requirements. The results of the Contact Capability test shall be considered for PDA.</p>