MARK-UP FOR DCR

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15/11/11

European Space Components Coordination

Pages 1 to 25

CONNECTORS, ELECTRICAL, TRIAXIAL, BAYONET COUPLING, MIL-STD-1553B DATABUS WITH NON-REMOVABLE CRIMP CONTACTS

BASED ON TYPE ACB1 SERIES

ESCC Detail Specification No. 3401/079

2 Draft A	November 2011
Issue 1	~~October 2008~~

esa

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

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DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
	Specification updated to incorporate editorial and technical changes per DCR

DCR

Variant	Component Type Note 3	Contact Type	Accepted AWG24 Cable Outer Diameter (mm) Note 1	Weight Max. (g)
10	Bulkhead Jack 3 Lugs, Straight	Socket	>3.4, ≤ 3.8	9
11	Bulkhead Jack 3 Lugs, Right Angle	Socket	≤ 3.4	11.5
12	Bulkhead Jack 3 Lugs, Right Angle	Socket	>3.4, ≤ 3.8	11.5
13	Bulkhead Jack 4 Lugs, Straight	Socket	≤ 3.4	9
14	Bulkhead Jack 4 Lugs, Straight	Socket	>3.4, ≤ 3.8	9
15	Bulkhead Jack 4 Lugs, Right Angle	Socket	≤ 3.4	11.5
16	Bulkhead Jack 4 Lugs, Right Angle	Socket	>3.4, ≤ 3.8	11.5
17	Bulkhead Jack 3 Lugs, Pigtail	Socket	Not applicable	12 Note 2
18	Bulkhead Jack 4 Lugs, Pigtail	Socket	Not applicable	12 Note 2

NOTES:

1. All cables are 77Ω MIL-STD-1553B Data Bus twisted shielded pairs.
2. Supplied with one nut and plain washer assembled with 30cm of AWG24 twisted pair cable per ESCC 3901/013 Variant 08 or equivalent. The colour of the wires are not user definable and they are not colour coded to denote connection.
3. With the exception of Variants 17 and 18 all connectors are supplied in kits comprising:
   - one connector shell.
   - one insulator.
   - one contact (pin or socket).
   - one ferrule.
   - one heat shrinkable strain relief sleeve (Right Angle Variants only).
   - one nut and plain washer (Bulkhead Variants only).

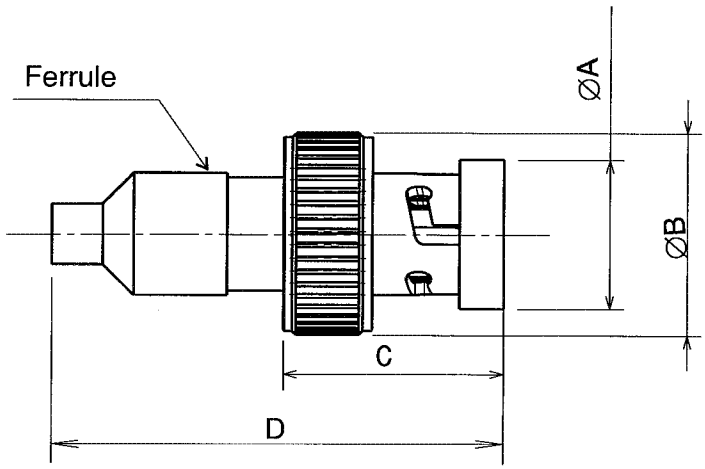
TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristics	Symbol	Maximum Rating	Unit	Notes
1	Working Voltage	U_R	200	Vrms	
2	Rated Current (contact)	I_{CR}	1	A	
3	Operating Temperature Range	T_{op}	-55 to +150	°C	T_{amb}
4	Storage Temperature Range	T_{stg}	-55 to +150	°C	
5	Mounting Nut Locking Torque Range	τ_m	1.9 to 2.1	Nm	Variants 09 through 18

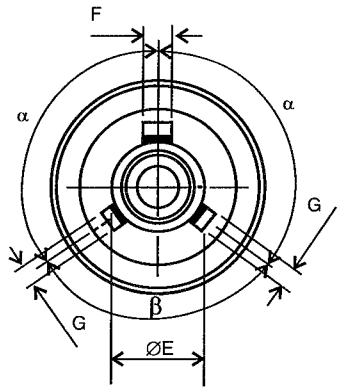
FIGURE 2 - PHYSICAL DIMENSIONS

Consolidated Notes are at the end of Figure 2.

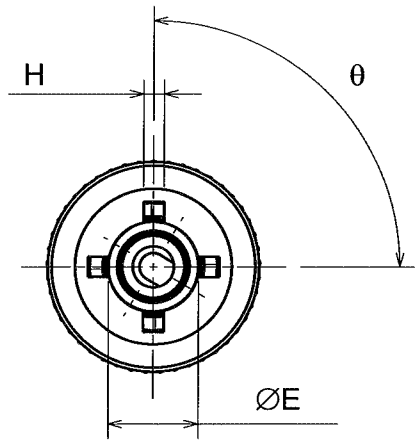
FIGURE 2(a) - Plug, Straight (Variants 01, 02, 05 and 06)



3 Lug Version



4 Lug Version



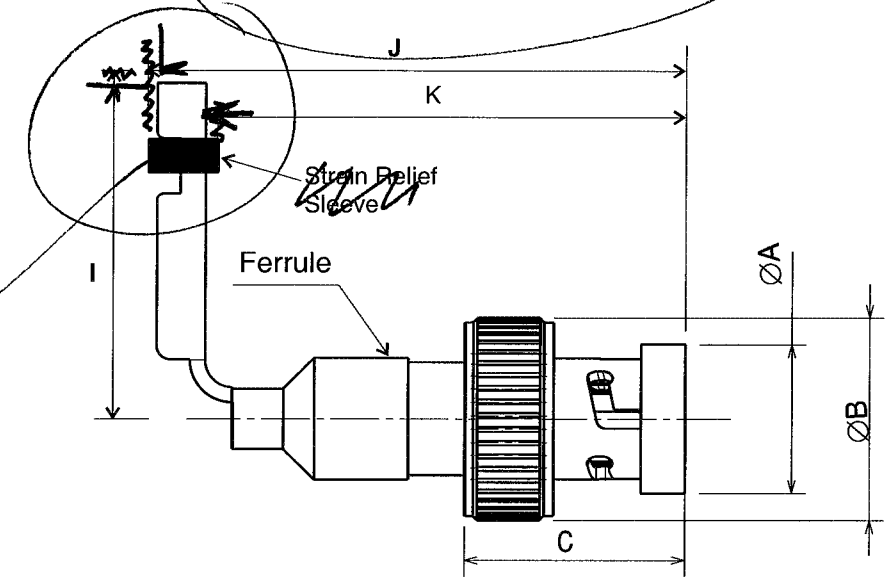
Symbols	Dimensions mm		Notes
	Min	Max	
ØA	-	~~10.8~~ 10.9	
ØB	~~14.5~~ —	14.65	
C	~~15.91~~ —	~16.6	
D	-	~~33.8~~ 35	
ØE	6.2	6.3	
F	1.95	2.05	1
G	1.37	~~1.45~~ 1.47	2
H	~~1.42~~ 1.37	~1.47	3
α	~~124°~~ 123°	~~126°~~ 127°	2
β	~~109°~~ 108°	~~111°~~ 112°	1

Symbols	Dimensions mm		Notes
	Min	Max	
θ	~~80°~~ 88°	~~91°~~ 92°	3

Figure 2(b) - Plug, Right Angle (Variants 03, 04, 07 and 08)

Correct drawing see attached

delete



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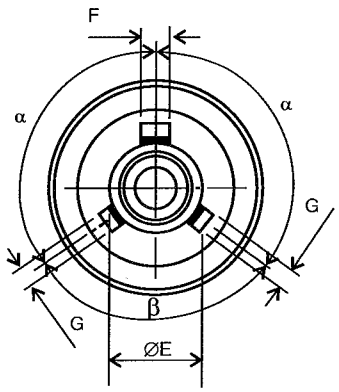

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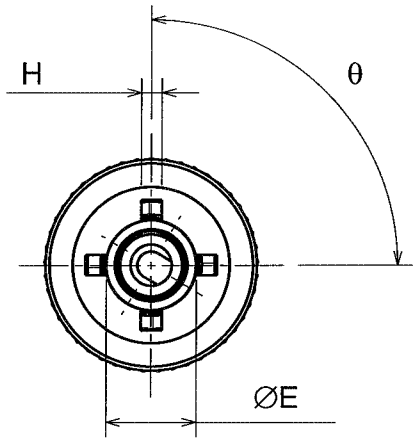
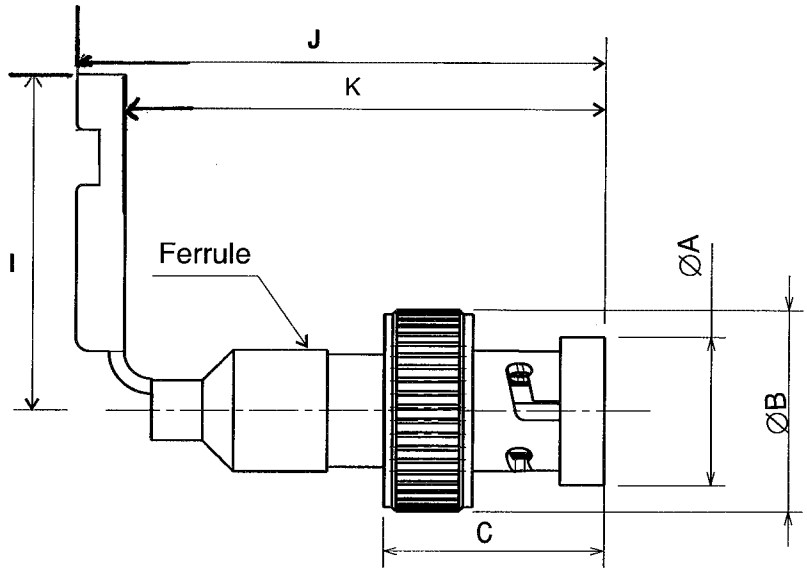


Symbols	Dimensions mm		Notes
	Min	Max	
ØA	-	~~10.8~~ 10.9	
ØB	~~14.5~~ -	~~14.65~~ 14.65	
C	~~15.81~~ -	~16.6	
ØE	6.2	6.3	
F	1.95	2.05	1

Symbols	Dimensions mm		Notes
	Min	Max	
θ	88°	92°	3

Corrected drawing

Figure 2(b) - Plug, Right Angle (Variants 03, 04, 07 and 08)



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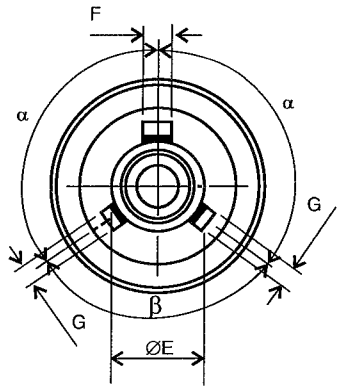

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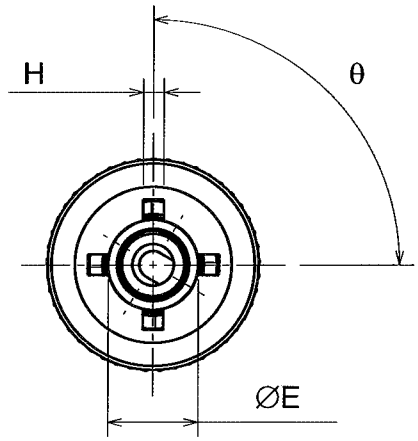
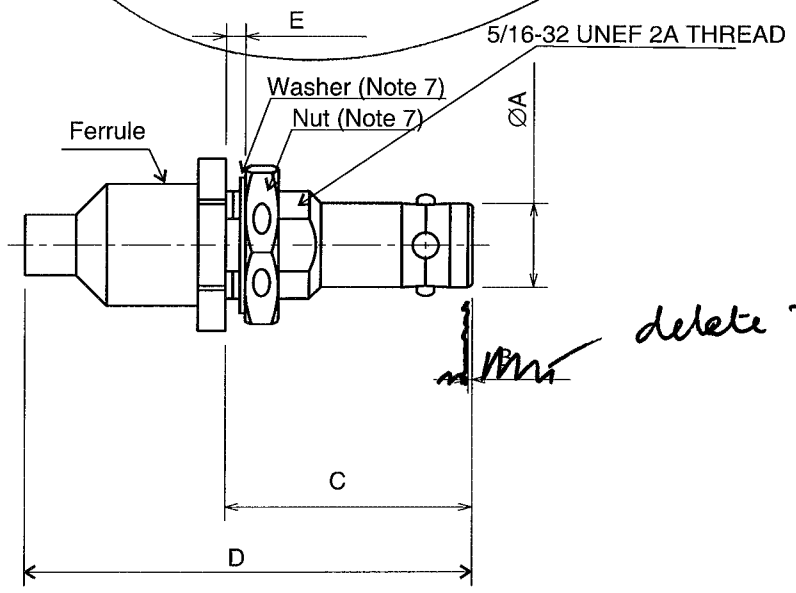


Symbols	Dimensions mm		Notes
	Min	Max	
ØA	-	10.9	
ØB	-	14.65	
C	-	16.6	
ØE	6.2	6.3	
F	1.95	2.05	1

Symbols	Dimensions mm		Notes
	Min	Max	
G	1.37	1.47	2
H	~~1.42~~ 1.37	~~1.52~~ 1.47	3
I	~~24~~ –	~~28~~ 28	
J	~~40~~ –	~~40~~ 40	
K	~~30~~ 32	-	
α	~~124°~~ 123°	~~126°~~ 127°	2
β	~~109°~~ 108°	~~111°~~ 112°	1
θ	~~88°~~ 88°	~~91°~~ 92°	3

Figure 2(c) - Bulkhead Jack, Straight (Variants 09, 10, 13 and 14)



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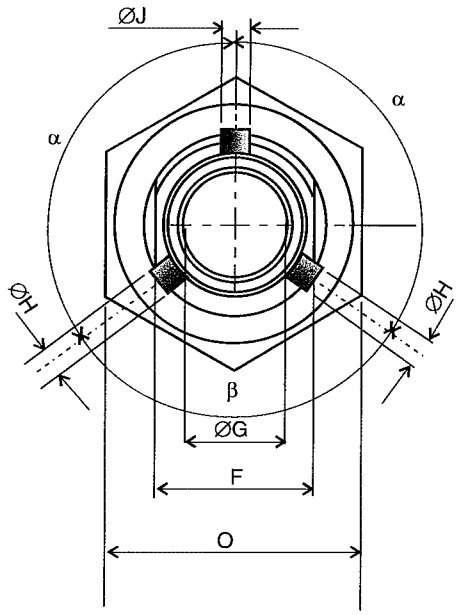

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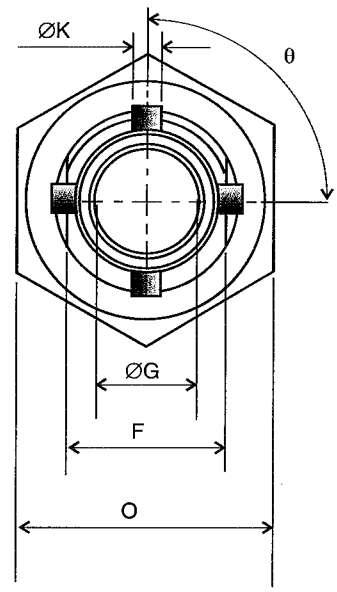
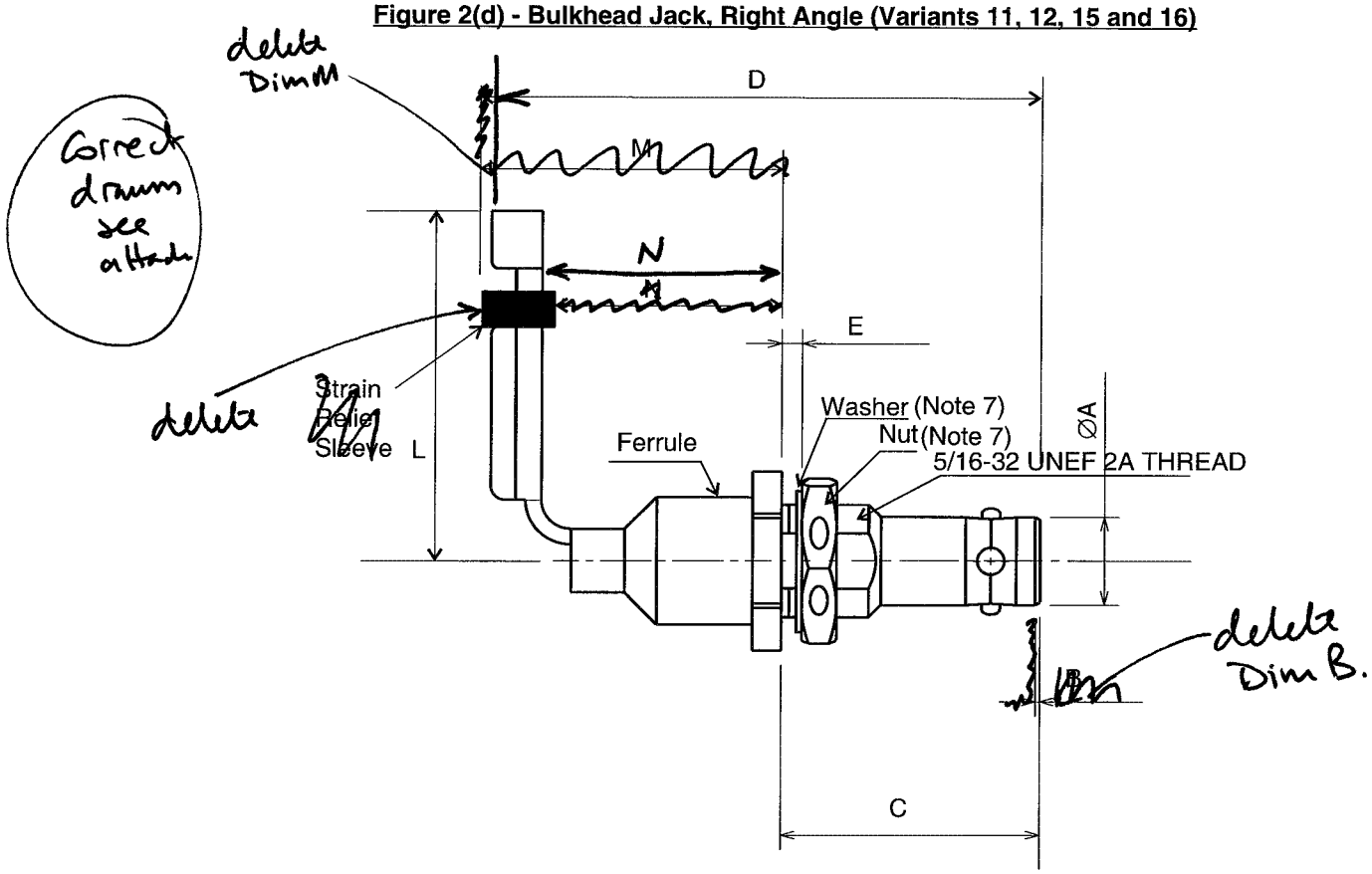


Symbols	Dimensions mm		Notes
	Min	Max	
ØA	6.08	6.12	
~~B~~	~~0.05~~	~~0.25~~	
C	17.8	18	
D	-	~~38.5~~ 35	
E	~~3.5~~ 1	3.5	4
F	~~6.8~~ 6.75	~~6.85~~ 6.8	
ØG	2.85	2.9	
ØH	1.22	1.32	2
ØJ	1.83	1.93	1
ØK	1.22	1.32	3
O	10.9	11	
α	~~124°~~ 123°	~~126°~~ 127°	2
β	~~109°~~ 108°	~~111°~~ 112°	1
θ	~~89°~~ 88°	~~91°~~ 92°	3

Figure 2(d) - Bulkhead Jack, Right Angle (Variants 11, 12, 15 and 16)



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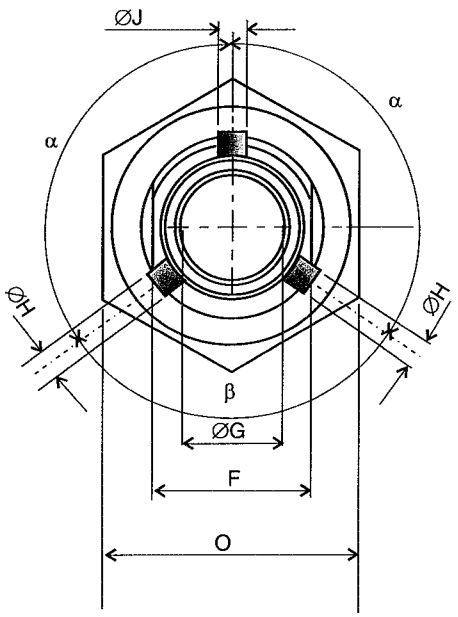

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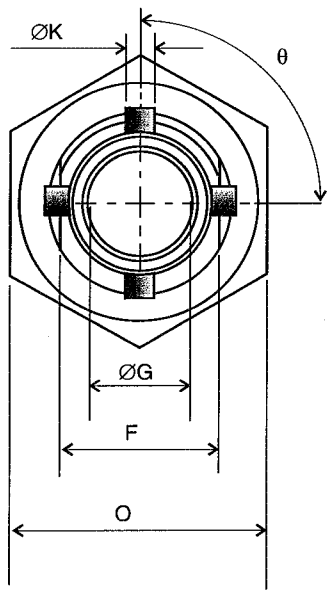
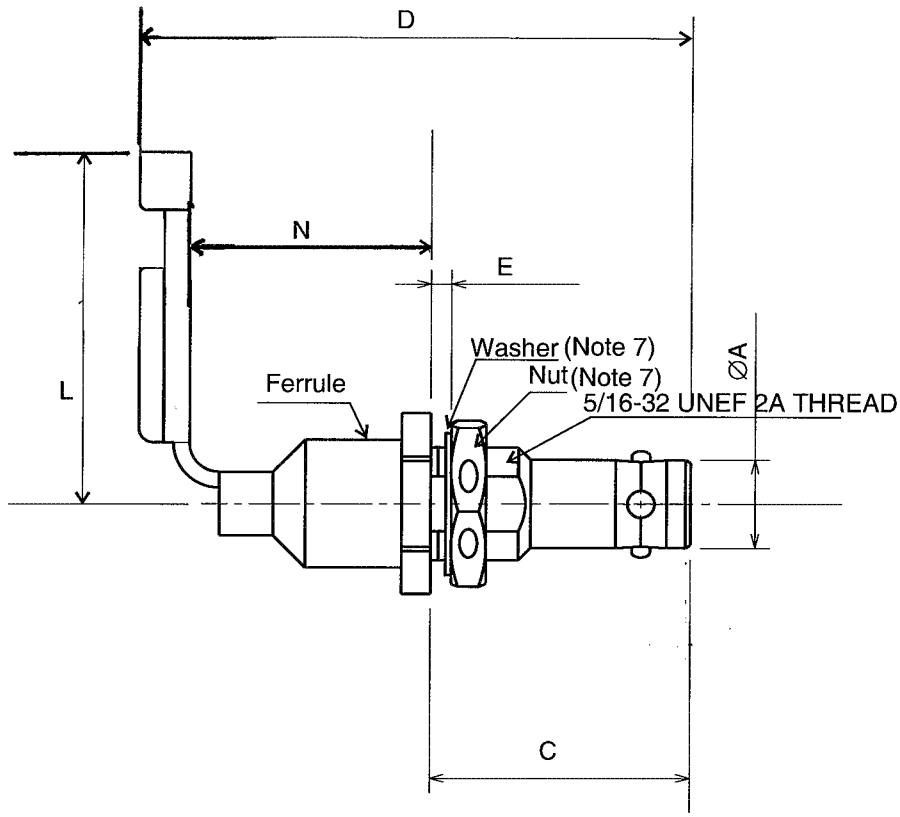


Figure 2(d) - Bulkhead Jack, Right Angle (Variants 11, 12, 15 and 16)

Corrected drawing.



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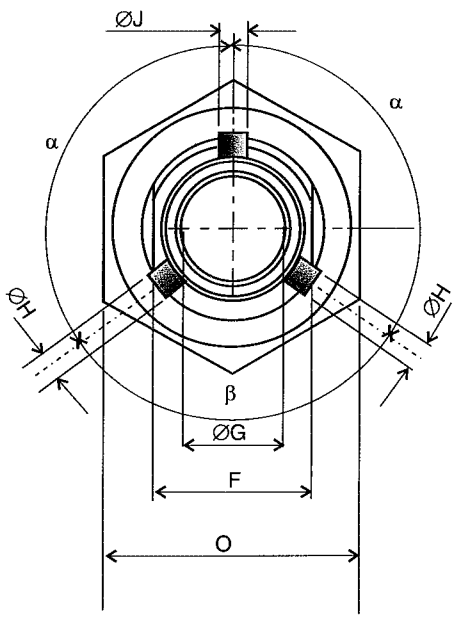

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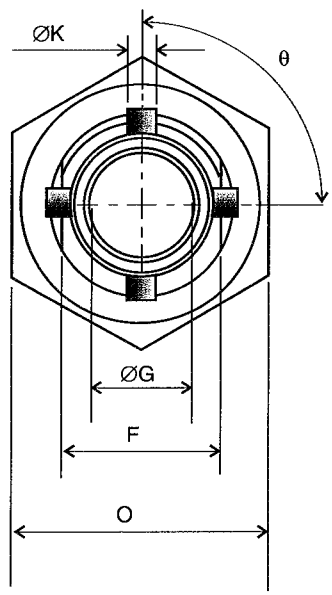
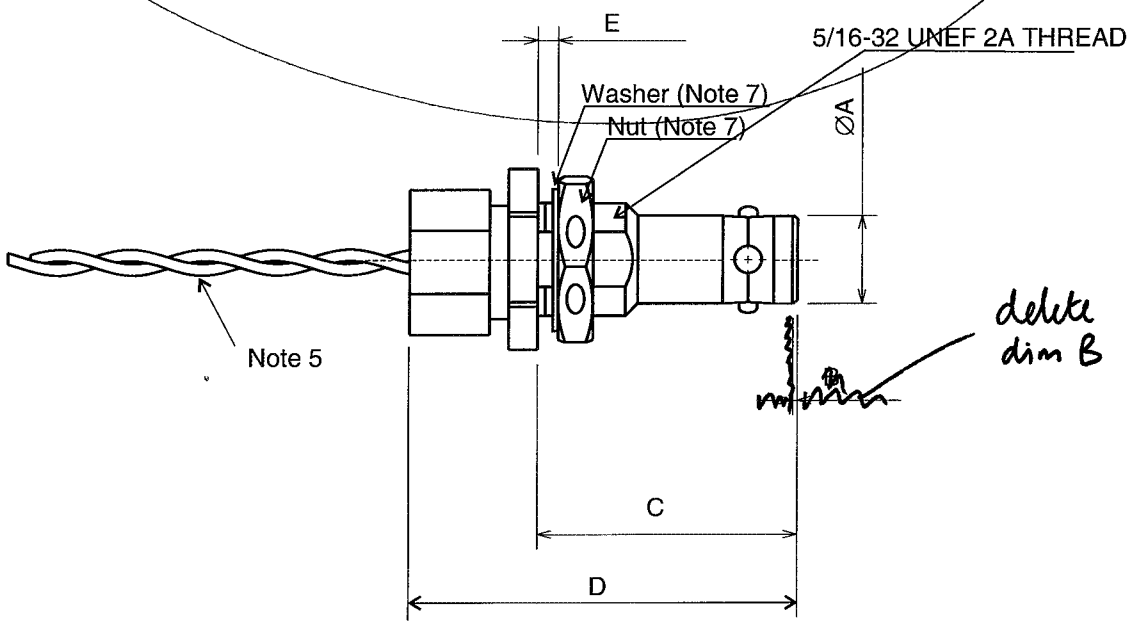
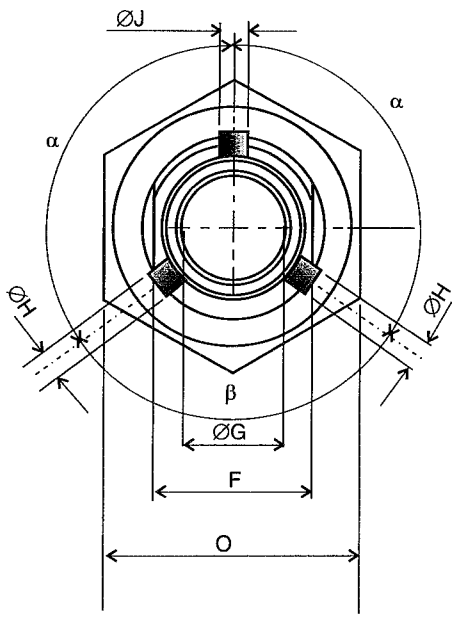


Symbols	Dimensions mm		Notes
	Min	Max	
ØA	6.08	6.12	
~~B~~	~~0.05~~	~~0.25~~	
C	17.8	18	
D	-	~~41~~ 40	
E	~~3.5~~ 1	3.5 ~~m~~	4
F	~~6.8~~ 6.75	~~6.85~~ 6.8	
ØG	2.85	2.9	
ØH	1.22	1.32	2
~~ØI~~	~~1.27~~	-	
ØJ	1.83	1.93	1
ØK	1.22	1.32	3
L	~~28~~ -	~~n~~ 28	
~~M~~	-	21	
N	~~n~~ 13.7	~~15~~ -	
O	~~n~~ 10.9	11	
α	~~124°~~ 123°	~~126°~~ 127°	2
β	~~109°~~ 108°	~~111°~~ 112°	1
θ	~~89°~~ 88°	~~91°~~ 92°	3

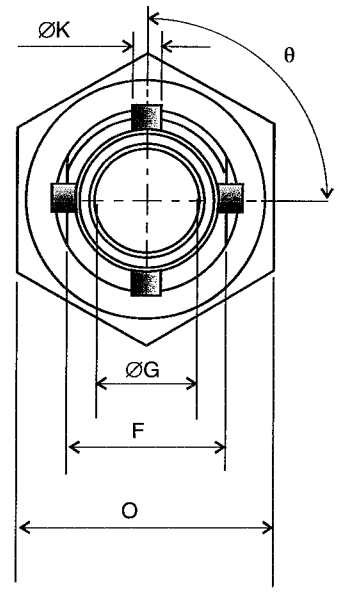
Figure 2(e) - Bulkhead Jack, Pigtail (Variants 17 and 18)



3 Lug Version



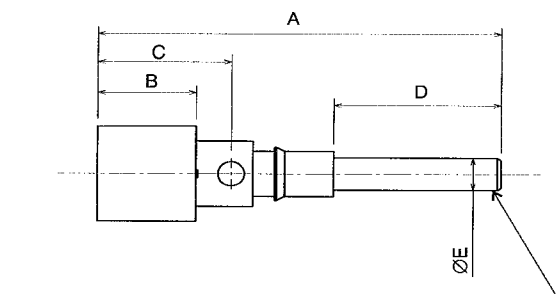
4 Lug Version



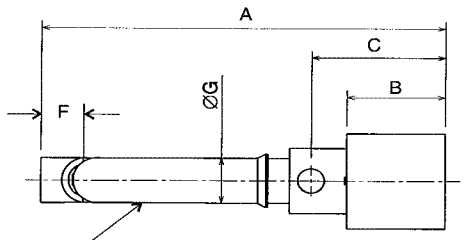
Symbols	Dimensions mm		Notes
	Min	Max	
ØA	6.08	6.12	
ØB	0.05	0.25	
C	17.8	18	
D	-	27	
E	~~3.5~~ 1	3.5 m	4
F	~~6.8~~ 6.75	~~6.85~~ 6.8	
ØG	2.85	2.9	
ØH	1.22	1.32	2
ØJ	1.83	1.93	1
ØK	~~1.2~~ 1.22	~~1~~ 1.32	3
O	10.9	11	
α	~~124°~~ 123°	~~126°~~ 127°	2
β	~~109°~~ 108°	~~111°~~ 112°	1
θ	~~89°~~ 88°	~~91°~~ 92°	3

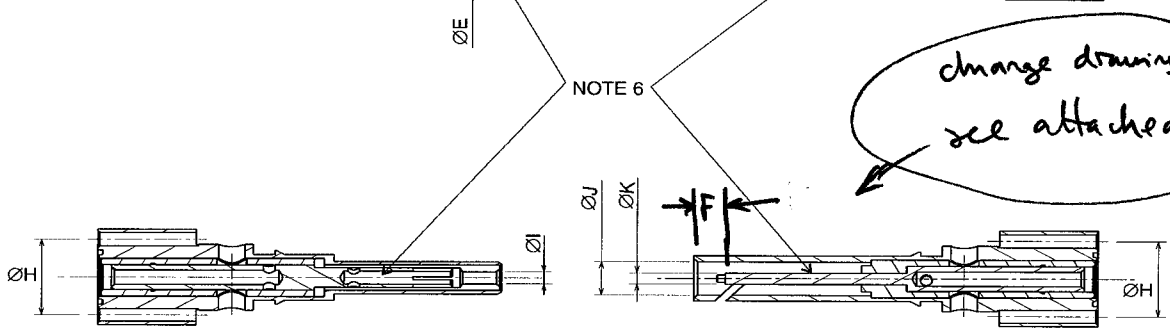
Figure 2(f) - Inner Contacts

Pin Contacts (Variants 01 to 08)



Socket Contacts (Variants 09 to 18)



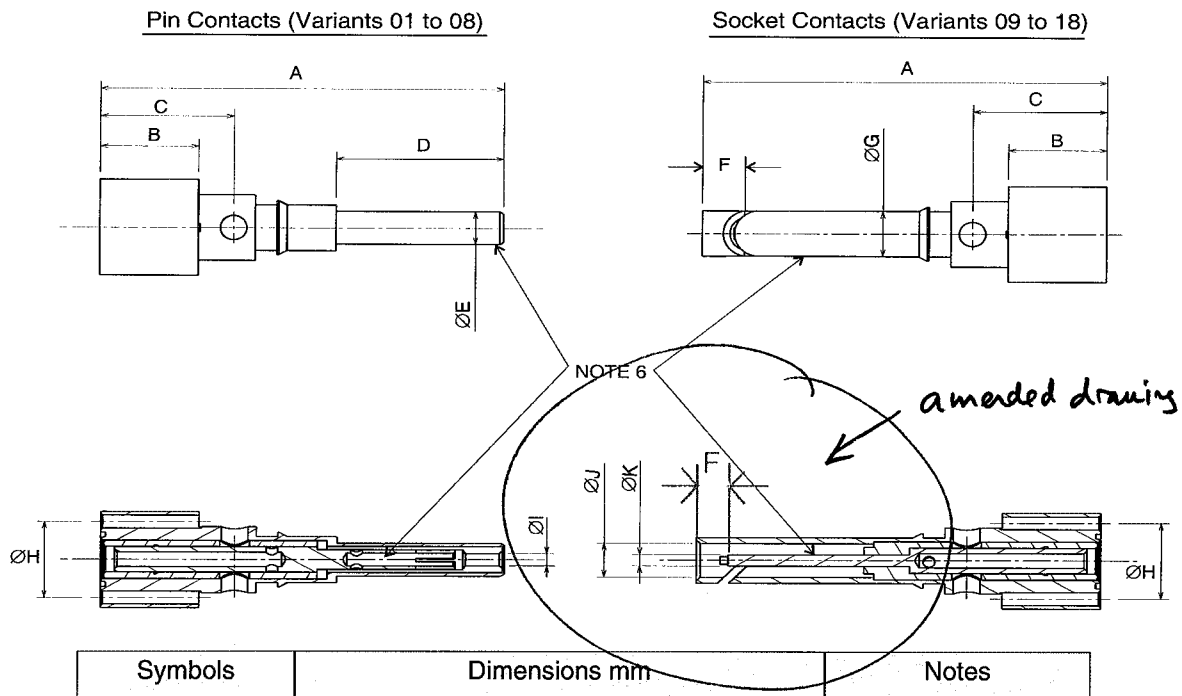


Symbols	Dimensions mm		Notes
	Min	Max	
A	20.45	20.55	
B	~~4.95~~ 4.9	~~5.05~~ 5.1	
C	~~6.75~~ 6.67	~~6.85~~ 6.93	
D	8.4	8.6	
ØE	1.8	1.82	
F	1.2	1.4	
ØG	~~2.48~~ 2.5	~~2.58~~ 2.6	
ØH	4.15	4.25	
ØI	~~0.65~~ 0.64	0.7	
ØJ	~~1.85~~ 1.89	~~1.87~~ 1.91	
ØK	0.61	0.63	

Consolidated Notes for Figure 2

1. 1 place.
2. 2 places.
3. 4 places.
4. ~~Maximum panel thickness.~~ Range of acceptable panel thickness
5. See Note 2 of Type Variants.
6. Measurement points for Gold Plating Thickness testing.
7. Nut and plain washer in accordance with 5/16-32 UNEF 2A. The nut shall have three holes of diameter 1.2 ±0.1mm for use with AWG24 locking wire.

Figure 2(f) - Inner Contacts



Symbols	Dimensions mm		Notes
	Min	Max	
A	20.45	20.55	
B	4.90	5.10	
C	6.67	6.93	
D	8.4	8.6	
ØE	1.8	1.82	
F	1.2	1.4	
ØG	2.50	2.60	
ØH	4.15	4.25	
ØI	0.64	0.7	
ØJ	1.89	1.91	
ØK	0.61	0.63	

Consolidated Notes for Figure 2

1. 1 place.
2. 2 places.
3. 4 places.
4. Range of acceptable panel thickness
5. See Note 2 of Type Variants.
6. Measurement points for Gold Plating Thickness testing.
7. Nut and plain washer in accordance with 5/16-32 UNEF 2A. The nut shall have three holes of diameter 1.2 ±0.1mm for use with AWG24 locking wire.

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) MIL-STD-1553B, Aircraft Internal Time Division Command/Response Multiplex Data Bus.
(c) ASTM-B-733, Metal, Autocatalystic Electroless Nickel-Phosphorus Coatings on.
(d) MIL-G-45204, Gold plating, electro deposited.
(e) ~~ECSS-Q-70-26~~ ECSS-Q-ST-70-26, Crimping of high-reliability electrical connections.

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

see attached * ~~None~~.

4.2.2 Deviations from Final Production Tests (Chart IIb)

(a) Para. 9.2, Mating Verification: shall be performed on the connector body without contacts.
(b) Para. 9.5, Magnetism Level: Not applicable.
(c) Para. 9.8, Installation of Contacts into Inserts: Not applicable.
(d) Para. 9.1.4, Electrical Measurements at Room Temperature: shall be performed on 5% of the production lot or a minimum of 3 samples, which shall be assembled for test purposes.

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. 9.9, Seal Test: Not applicable.
(b) Para. 9.10, Wiring: Voltage Drop shall be tested as specified in Table 2 ~~per ESA/ESCC QQ-70-26A Paragraph 6.2~~, and Rated Current Contact Resistance shall also be performed.

4.2.1, Deviations from Special In-Process Controls
a) Para 5.2.4, Crimping Capability: shall be performed on a sample of 5% of the production lot or a minimum of 3 samples, limited to 10 contacts. The requirements of ECSS-Q-ST-70-26 shall be applied. Voltage Drop shall be tested as specified in Table 2 herein.

4.3.11 Probe Damage

Not applicable.

4.3.12 Solderability

Not applicable.

4.3.13 Joint Strength (Ferrule and Shell to AWG24 Cable Braid)

The connector ferrule and shell shall be crimped to compatible AWG24 MIL-STD-1553B single or double braid data bus cables for test purposes. The contacts shall not be wired. The minimum tensile joint strength measured between the connector and cable braid shall be 100N. Both single braid and double braid twisted shielded pair cables shall be tested with the connector.

4.3.14 Joint Strength (Contacts to AWG24 Cable Inner Wires)

Two AWG24 stranded wires shall be crimped, one to the central contact and one to the intermediate contact. The joints shall be pulled with the following limits applied:

Variant	Contact type	Wire type	Tensile strength minimum value
01 to 08	Pin	~~AWG 24, strand copper~~	~~40 N~~
		AWG 24, high strength copper alloy	60 N
09 to 18	Socket	~~AWG 24, strand copper~~	~~40 N~~
		AWG 24, high strength copper alloy	60 N

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 Connector Shell

The connector shell shall be made of brass (53% copper, 40% zinc and 3% lead). The plating shall be 5±1µm of nickel per ASTM-B-733.

4.4.2 Ferrule

The ferrule shall be made of copper alloy (99% copper and 1% tellurium). The plating shall be 5±1µm of nickel per ASTM-B-733.

4.4.3 Contacts

The contacts shall be made of copper alloy (98% copper and 2% beryllium) with 0.2µm of nickel underplating and gold plating of 1.27µm minimum per MIL-G-45204, Type II, Grade C, Class 1.

4.4.4 Insulator

The insulator parts shall be made of PTFE.

4.4.5 Cable for Variants 17 and 18

The cable used for Variants 17 and 18 shall be PTFE insulated high strength copper with a minimum of 2µm of silver plating per ESCC ~~3901013~~ or equivalent.

equivalent

3901/013 Variant 08

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°C.

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	Para. 9.1.1.1 DC Test Note 1	5000	-	MΩ
2	Voltage Proof Leakage Current	I_L	Para 9.1.1.2	900Vrms AC Test Note 1	-	1	mA
3	Low Level Contact Resistance	R_{cl}	Para 9.1.1.3	Para 9.1.1.3 Centre and Intermediate Contacts only	-	8	mΩ

No.	Characteristics	Symbol	ESCC 3401 Test Method	Test Conditions	Limits		Unit
					Min	Max	
4	Rated Current Contact Resistance	R_{cr}	Para 9.1.1.3	Para 9.1.1.3 Outer Contacts only I=1A Note 2	-	20	mΩ
5	Voltage Drop	V_d	-	ESCC Q-70-26A Para 6.2 I=1A Note 2	-	2	mV

NOTES:

1. 100% tested between the inner contacts during Final Production Tests.
2. Performed on assembled connectors during Final Production Tests and on assembled connectors for Environmental and Endurance Tests.

ESCC-Q-ST-70-26 Para. 5.4.2

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 and Table 1(a) of this spec.	Visual Examination	-	-	-	-	-
			Low Level Contact Resistance	Table 2 Item 3	R_{cl}	Table 2 Item 3		
			Rated Current Contact Resistance	Table 2 Item 4	R_{cr}	Table 2 Item 4		
			Voltage Drop	Table 2 Item 5	V_d	Table 2 Item 5		
02	Vibration	Para. 9.11	**Initial Measurements** (1) Mounting Nut Locking Torque	Variants 09 through 18 only	τ_m	Table 1(b) Item 5 Record Values		
			(2) Coupling Torque		τ_c	Para. 4.3.5 of this spec. Record Values		
			Final Measurements					
			(1) Mounting Nut Unlocking Torque Drift	Variants 09 through 18 only	$\Delta\tau_m$	-25	-	%
			(2) Coupling Torque Drift		$\Delta\tau_c$	-25	+25	%
			Visual Examination	-	-	-	-	-
03	Shock or Bump	Para. 9.12	**Initial Measurements** (1) Mounting Nut Locking Torque	Variants 09 through 18 only	τ_m	Table 1(b) Item 5 Record Values		
			(2) Coupling Torque		τ_c	Para. 4.3.5 of this spec. Record Values		

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	
			Visual Examination	-	-	-	-	
			Mating/Unmating Forces	After 2 hours minimum recovery	F	Para. 4.3.5 of this spec.		
			Low Level Contact Resistance Drift	Table 2 Item 3	ΔR_{cl}	-	+5	mΩ
		Para. 9.1.1.4	Mated Shell Conductivity Drift	Variants 09 through 18 only	Δ	-	+5	mΩ
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2 900Vrms	I_L	Table 2 Item 2		
11	Permanence of Marking	Para. 9.19	-	-	-	Not 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 Resistance	Table 2 Item 3	R_{cl}	Table 2 Item 3 Record Values		
			Rated Current Contact Resistance	Table 2 Item 4	R_{cr}	Table 2 Item 4 Record Values		
		Para. 9.1.1.4	Mated Shell Conductivity	Variants 09 through 18 only	-	-	20	mΩ
						Record Values		
			Final Measurements					
			Visual Examination	-	-	-	-	
			Mating/Unmating Forces	-	F	Para. 4.3.5 of this spec.		
			Low Level Contact Resistance Drift	Table 2 Item 3	ΔR_{cl}	-	+5	mΩ
			Rated Current Contact Resistance Drift	Table 2 Item 4	ΔR_{cr}	-	+5	mΩ
			Insulation Resistance	Table 2 Item 1	R_i	Table 2 Item 1		
			Voltage Proof Leakage Current	Table 2 Item 2 $900V_{rms}$	I_L	Table 2 Item 2		
			Contact Retention (in insert)	Para. 4.3.4 of this spec.	-	Para. 4.3.4 of this spec.		
		Para. 9.1.1.4	Mated Shell Conductivity Drift	Variants 09 through 18 only	Δ	-	+5	mΩ
14	Corrosion	Para. 9.22	Visual Examination	-	-	-	-	
15	Insert Retention (in shell)	Para. 9.23 & Para. 4.3.6 of this spec.	-	-	-	Not applicable		
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	-	-	-	Not applicable		
17	High Temperature Measurements	Para. 9.25	Insulation Resistance	Table 2 Item 1 at maximum operating temperature	Ri	1000	-	MΩ
18	Overload Test	Para. 9.26	-	-	-	Not applicable		

Ri