FAST-LOCKING SCREW LOCK ASSEMBLIES FOR RECTANGULAR CONNECTORS 3401/001, 3401/002 AND CONNECTOR SAVERS 3401/020, 3401/080

ESCC Detail Specification No. 3401/085

Issue 3 Draft A	March 2015

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

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DCR No.	CHANGE DESCRIPTION

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1 GENERAL

1.1 SCOPE

This specification details the ratings, physical and mechanical characteristics, test and inspection data for Fast-Locking Screw Lock Assemblies for Rectangular Connectors (D*M and D*MA) and Connector Savers (D*BM and D*BMA). It shall be read in conjunction with ESCC Generic Specification No. 3401, the requirements of which are supplemented herein and ESCC Detail Specifications Nos. 3401/001, 3401/002, 3401/020 and 3401/080.

1.2 COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS

The type variants of accessories 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 accessories specified herein, are given in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

Not applicable.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the accessories 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. 3401/001, Connectors, Electrical, Rectangular, Miniature, Non-removable Solder Bucket, PCB and Wire-Wrap Contacts and Removable Coaxial and Power Contacts, based on Type D*M.
(c) ESCC Detail Specification No. 3401/002, Connectors, Electrical, Rectangular, Removable Crimp Contacts, based on Type D*MA.
(d) ESCC Detail Specification No. 3401/020, Connector Savers, Electrical, Rectangular, Miniature, Removable Contacts, based on Type D*BMA.
(e) ESCC Detail Specification No. 3401/022, Accessories for Rectangular Connectors 3401/001, 3401/002 and Connector Savers 3401/020, 3401/080.
(f) ESCC Detail Specification No. 3401/072, Lightweight Accessories for Rectangular Connectors 3401/001 and 3401/002.
(g) ESCC Detail Specification No. 3401/080, Connector Savers, Electrical, Rectangular, Miniature, Non-removable Signal Contacts and Removable Coaxial and Power Contacts, based on Type D*BM.

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.

TABLE 1(a) – TYPE VARIANTS

VARIANT	DESCRIPTION	WEIGHT MAX (g)
01	Male Fast-Locking Screw Lock Assembly, For Connectors without Back Shell, Brass	1
02	Male Fast-Locking Screw Lock Assembly, For Connectors with Back Shell, Brass	1 (1)
03	Female Fast-Locking Screw Lock Assembly, Brass	1.5
04	Fast-Locking Screw Lock Assembly, For Saver Connectors, Brass	1.2
05	Fast-Locking Screw Lock Assembly, For Hybrid Saver Connectors, Brass	1.2
06	Security Pin For Male Fast-Locking Screw Lock Assemblies	0.3

TABLE 1(b) – MAXIMUM RATINGS

No.	Characteristic	Symbol	Maximum Ratings	Unit	Remarks
1	Operating Temperature Range	T_{op}	-55 to +125	°C	T_{amb}
2	Storage Temperature Range	T_{stg}	-55 to +125	°C	
3	Locking Force	F_{LO}	30	N	For Male and Male Saver side
4	Unlocking Force	F_{UN}	30	N	For Female and Female Saver side
5	Torque Value for Nuts and Bushing	Tqe	See Figure 2	cm.daN	For Female and Hybrid Savers

FIGURE 1 – PARAMETER DERATING INFORMATION

Not applicable.

NOTES:

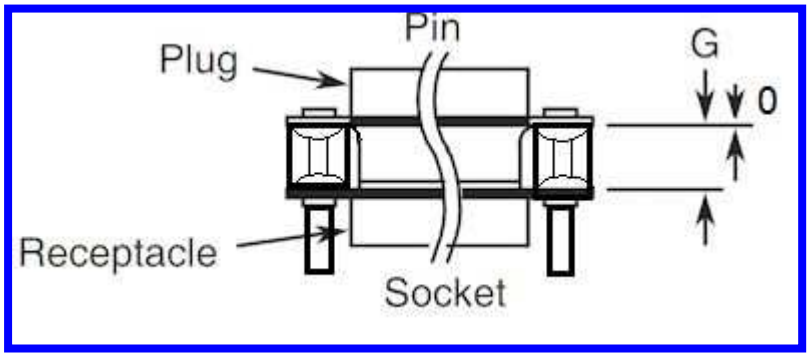
1. Backshells compatibles with Male Fast-Locking Screw Lock Assembly (Variant 02) are listed below :
   ESCC Detail Specification No. 3401/022: Variants 17 to 38 and Variants 81 to 8

   ESCC Detail Specification No. 3401/072: Variants 05 to 14, Variants 35 to 39, Variants 46 to 50 and Variants 61 to 65

FIGURE 2 – PHYSICAL DIMENSIONS

MATED SPACING BETWEEN SHELL FRONT SURFACES

(All dimensions in millimetres)



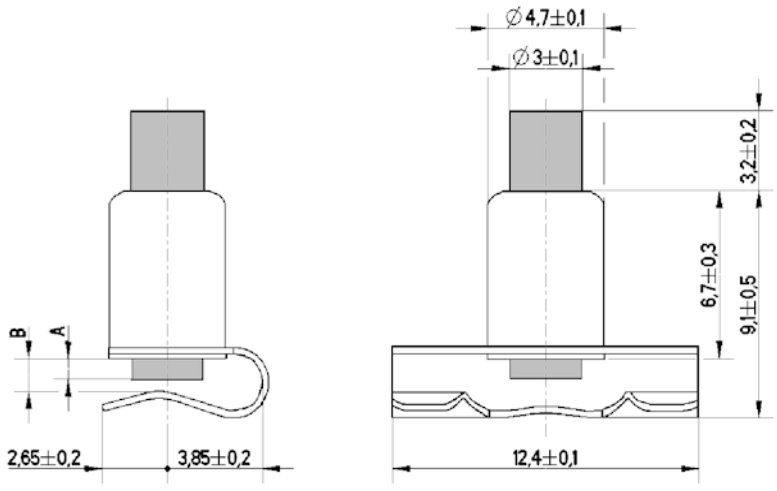
DIMENSION	MIN	MAX	NOTES
G	6.35	7.11	1, 3
	6.12	6.88	2, 3

NOTES:

1. For shell sizes E and A.
2. For shell sizes B, C, D and F.
3. The spacing between the reference planes of two mated connectors shall be adjusted by the use of three washers maximum (see Variant 03 dimensions) so the spacing is equal to dimension G. **Locking operation shall not be done before there is no gap between Female Fast-Locking Screw Lock Assembly and shell front surfaces.**

MALE FAST-LOCKING SCREW LOCK ASSEMBLIES (VARIANTS 01 AND 02)

(All dimensions in millimetres)

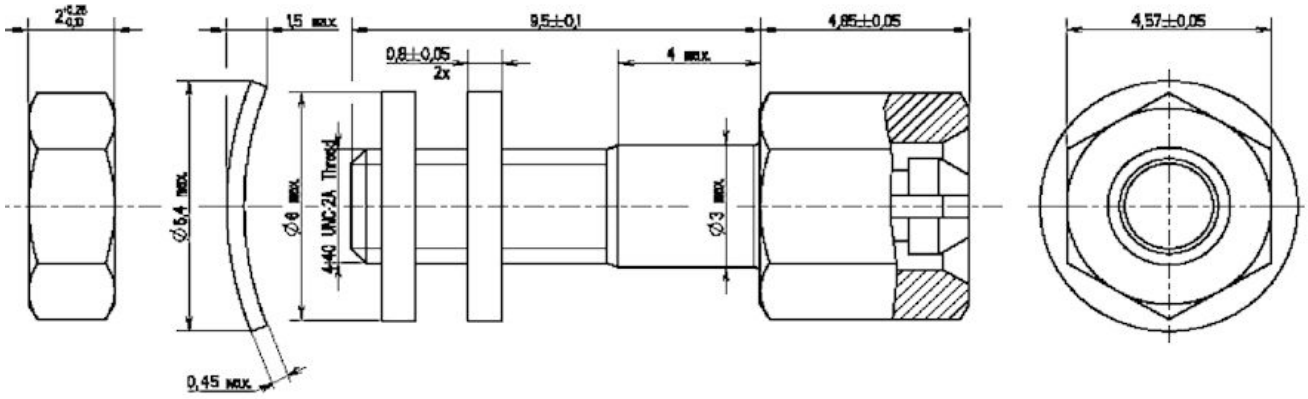


VARIANT	DIMENSION A		DIMENSION B	
	MIN	MAX	MIN	MAX
01	0.6	1	1.1	1.5
02	1	1.4	1.5	1.9

FIGURE 2 – PHYSICAL DIMENSIONS (CONTINUED)

FEMALE FAST-LOCKING SCREW LOCK ASSEMBLY (VARIANT 03)

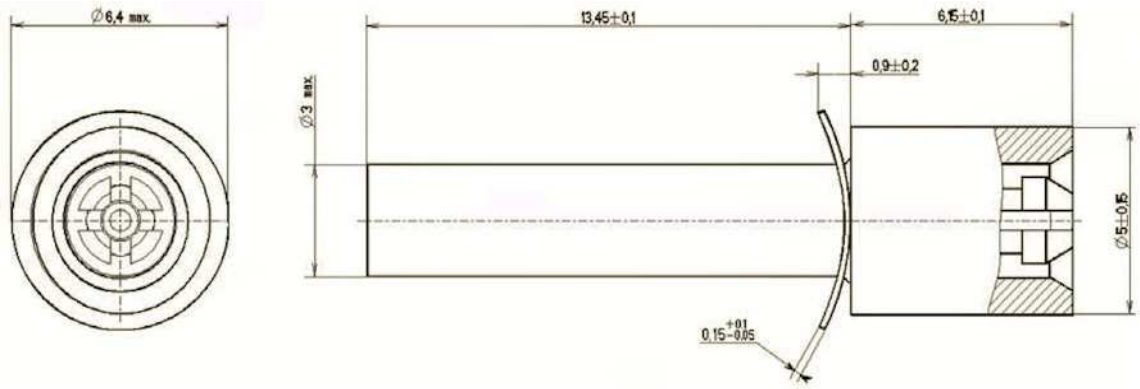
(All dimensions in millimetres)



No.	Characteristics	Symbol	Min. Limit	Max. Limit	Unit
1	Torque Value for Nuts	Tqe	4.4	4.9	cm.daN

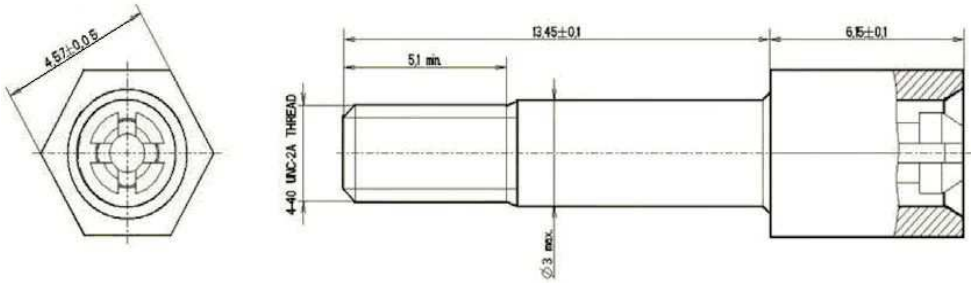
FAST-LOCKING SCREW LOCK ASSEMBLY FOR SAVER CONNECTORS (VARIANT 04)

(All dimensions in millimetres)



FAST-LOCKING SCREW LOCK ASSEMBLY FOR HYBRID SAVER CONNECTORS (VARIANT 05)

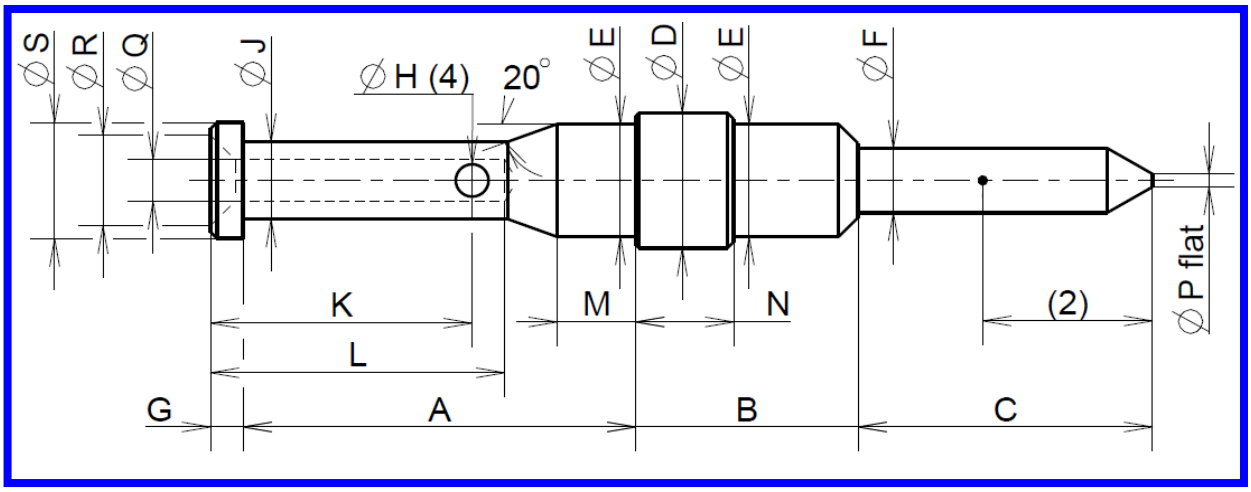
(All dimensions in millimetres)



No.	Characteristics	Symbol	Min. Limit	Max. Limit	Unit
1	Torque Value for Bushing	Tqe	4.4	4.9	cm.daN

SECURITY PIN FOR FAST-LOCKING SCREW LOCK ASSEMBLIES
(VARIANT 06)

(All dimensions in millimetres)



	A	B	C	ØD	ØE	ØF	G	ØH	ØJ	K
Min.	5,95	3,35	4,35	2,08	1,73	0,99	0,45	0,45	1,15	3,9
Max.	6,05	3,45	4,65	2,12	1,77	1,04	0,55	0,55	1,2	4,1

	L	M	N	ØP	ØQ	ØR	ØS
Min.	4,4	1,1	1,4	-	0,59	1,3	1,8
Max.	4,7	1,3	1,6	0,3	0,66	1,5	1,9

NOTES:

1. All dimensions are in millimetres.
2. Measurement point for plating thickness: 2,5±1.
3. Underlined dimensions in table are critical to ensure intermateability and interchangeability.
4. Inspection hole shall only penetrate one wall of the crimp barrel.
5. ØJ, ØQ and ØS to be concentric within 0,04.

4 REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the accessories specified herein shall be as stated in this specification and ESCC Generic Specification No. 3401. Deviations from the Generic Specification, applicable to this specification only, are listed in Para 4.2.

Deviations from the 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.

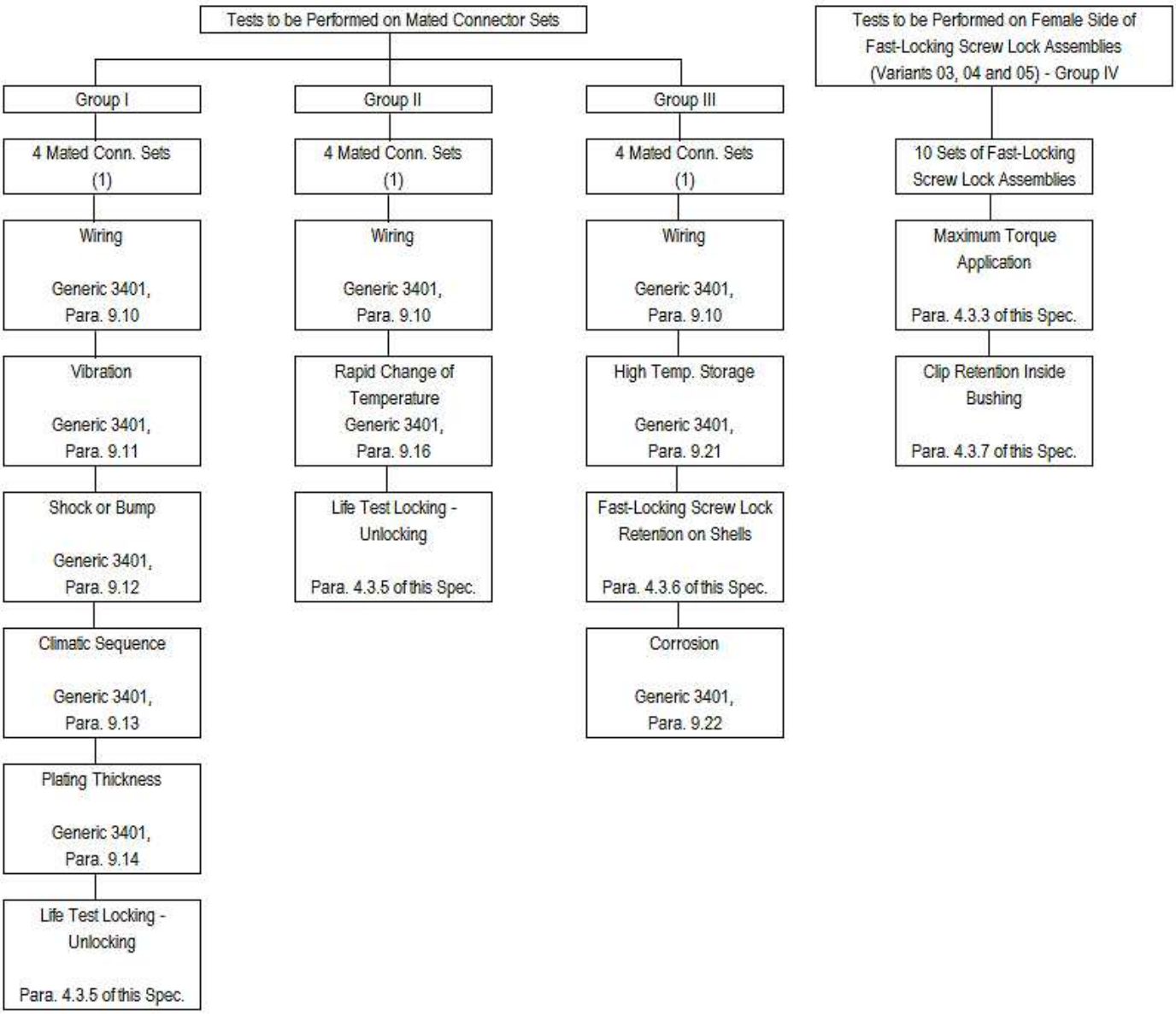
4.2.2 Deviations from Final Production Tests (Chart II)
Only the following tests shall be performed:

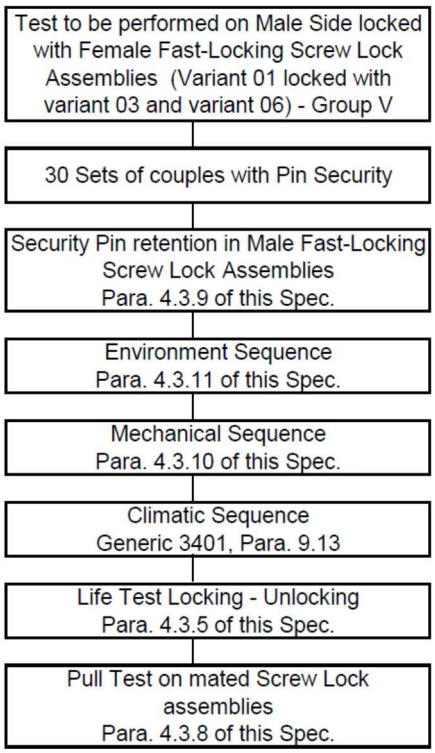
(a) Para. 9.2, Mating Verification.
(b) Para. 9.5, Magnetism Level.
(c) Para. 9.6, Dimension Check.
(d) Para. 9.7, External Visual Inspection. The magnification shall be ×3.
(e) Para. 4.3.4 of this Specification, Locking/Unlocking Forces.

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)
Not applicable.

4.2.4 Deviations from Qualification Tests (Chart IV)

Qualification testing shall be performed in accordance with the following Chart. No failures allowed.



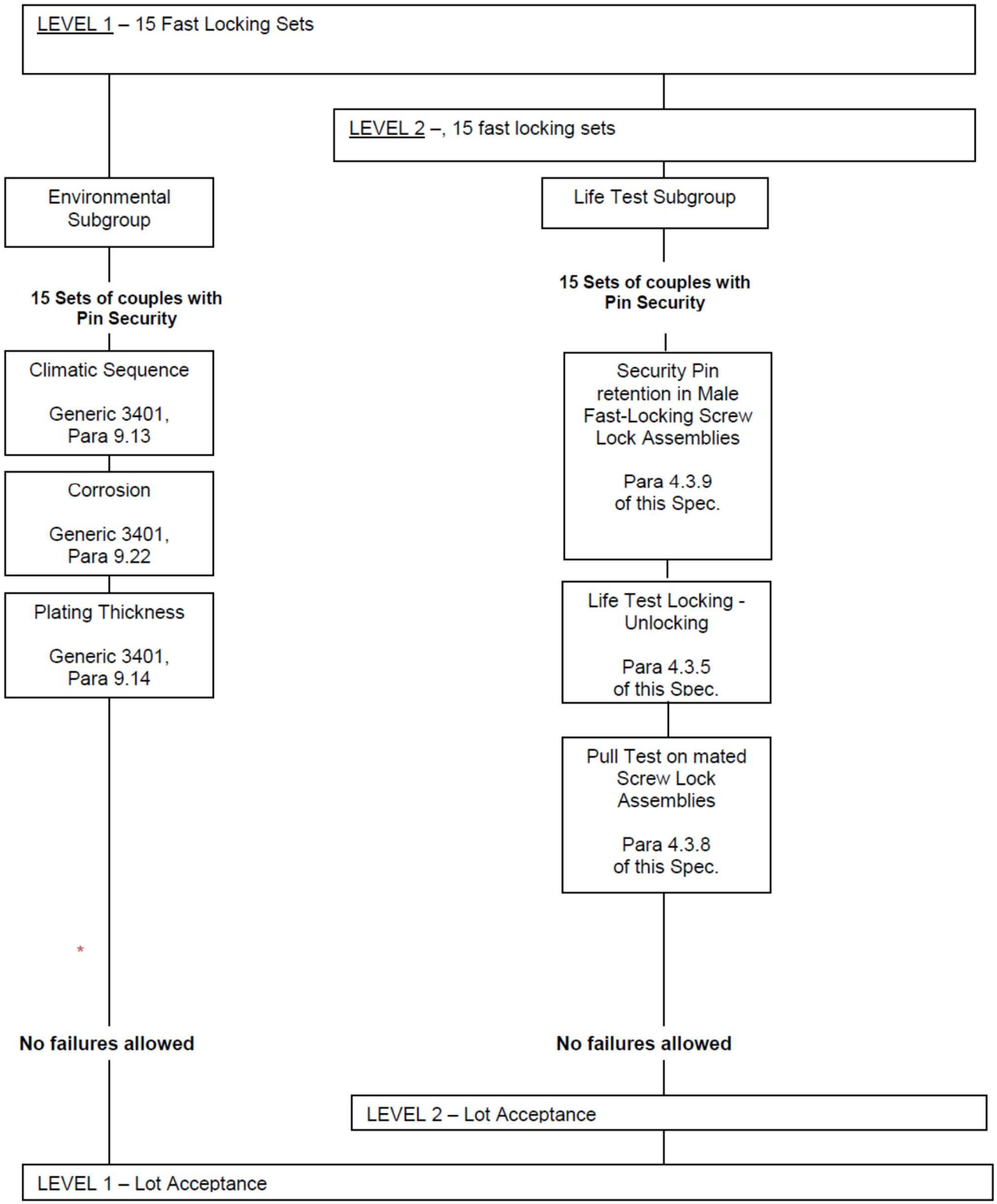


NOTES:

1. Equipped with Fast-Locking Screw Lock Assemblies.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

Lot Acceptance Levels 1 and 2 tests shall be performed in accordance with the following Chart.



4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the accessories 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

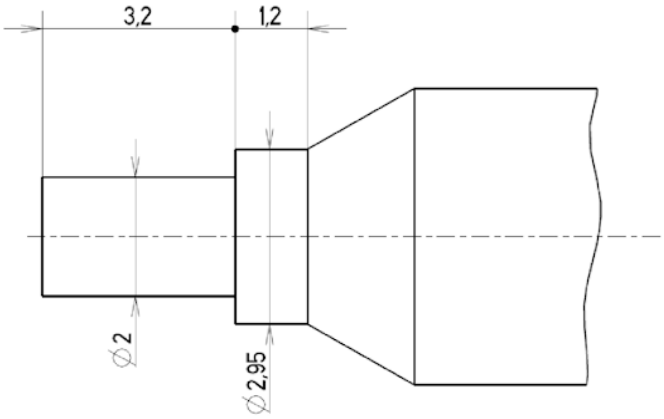
The maximum weight of the accessories specified herein shall be as shown in Table 1(a) of this specification.

4.3.3 Torque Value

The torque value to be used for tightening the screws of the accessories specified herein shall be as mentioned in Table 1(b) of this specification.

4.3.4 Locking / Unlocking Forces

The screw locks to be tested shall be put on appropriate equipment that reproduces the opposite side and ensures a mated spacing between shell front surfaces as defined in ESCC 3401/022 Figure 2. The locking operation is performed with the applicable test tool defined as follows:

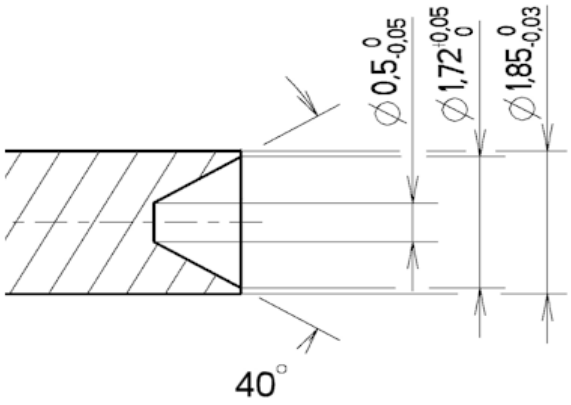


The locking speed shall be 5mm/s maximum.

The locking force is defined as the maximum force registered during the travel.

The locking force shall be checked and shall meet the requirements of Table 1(b) of this specification. For Qualification and Final Production tests, the measurements shall be recorded.

The unlocking operation is performed with the applicable test tool defined as follows:



The unlocking speed shall be 5mm/s maximum.

The unlocking force is defined as the maximum force registered during the test.

The unlocking force shall be checked and shall meet the requirements of Table 1(b) of this specification. For Qualification and Final Production tests, the measurements shall be recorded.

4.3.5 Life Test Locking – Unlocking

(a) Procedure

The screw locks to be tested shall be put on appropriate equipment that reproduces the opposite side and ensures a mated spacing between shell front surfaces as defined in ESCC 3401/022 Figure 2. The screw locks shall be subjected to 50 cycles (for both Qualification (Chart IV) and Lot Acceptance (Chart V) testing) with the tools defined in Paragraph 4.3.4.
A cycle is defined as one locking and one unlocking.
The male and female screw locks shall be completely separated during each cycle.
The locking speed shall be 5mm/s maximum.
The cycling rate shall be 8 cycles/minute maximum.

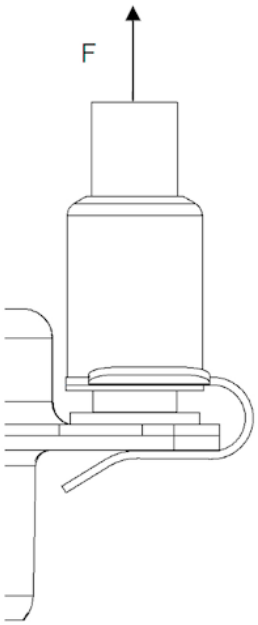
(b) Final Inspection

The components shall be physically examined and shall show no evidence of physical damage.

4.3.6 Fast-Locking Screw Lock Retention on Shells

This test is only applicable to male variants.

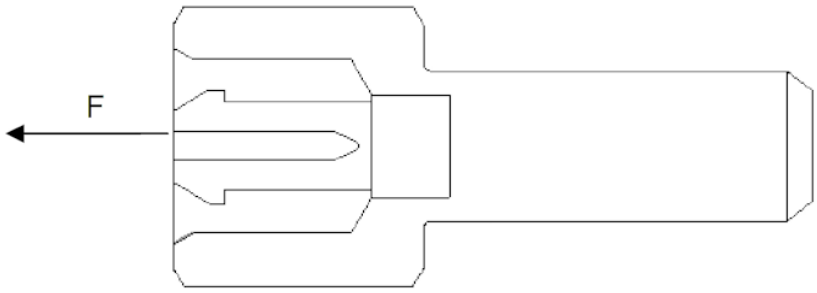
The male screw lock is mounted on a connector defined in ESCC 3401/001 Figure 2. The male screw lock shall withstand an axial force, F, of 20N without being dislodged from the shell.



4.3.7 Clip Retention Inside Bushing

This test is only applicable to female, saver and hybrid saver variants.

The clip inside the female screw lock shall withstand an axial force, F, of 150N without being dislodged from the bushing.



4.3.8 Pull Test on Mated Screw Lock Assemblies

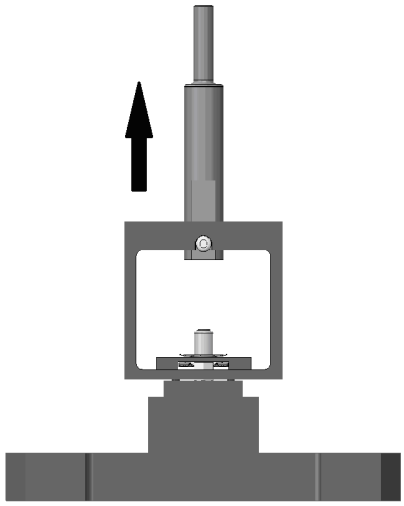
(a) Procedure

The Screw Lock to be tested shall be put on a specific equipment shown below that simulate assembly on mated connectors.

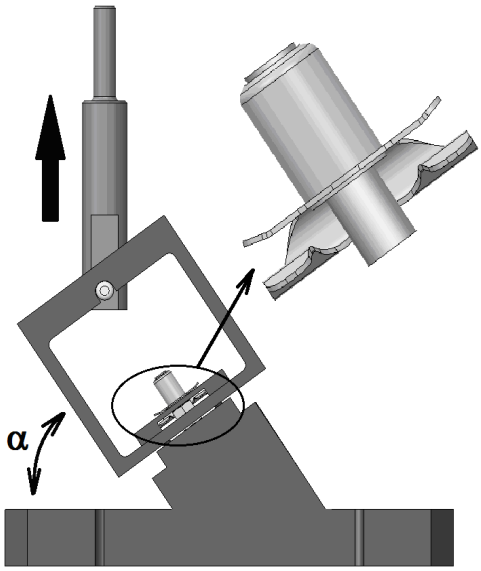
(b) Testing conditions with security contact

Tests are performed in the 3 following directions (non cumulative tests):

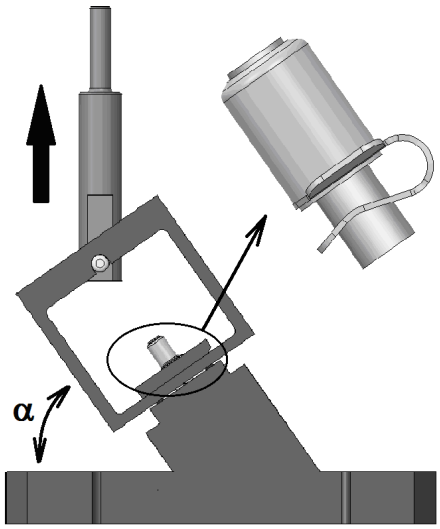
First direction: an axial force of 150N is applied



Second direction: a force of 50N is applied in following conditions (angle value: 45°)



Third direction: a force of 50N is applied in following conditions (angle value: 45°)



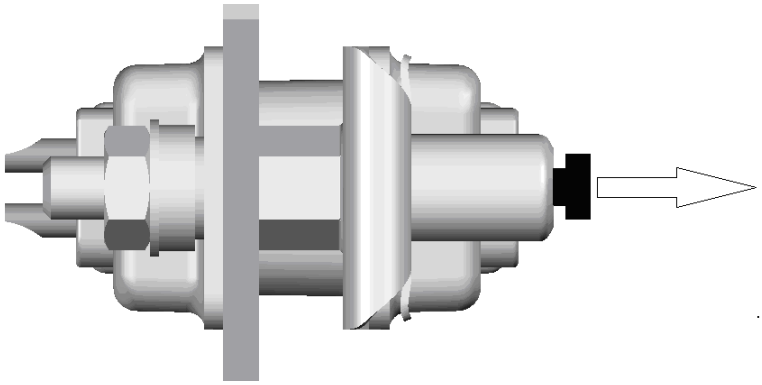
(d) Final inspection

The components shall be physically examined and shall show no evidence of physical damage.

4.3.9 Security Pin Retention in Male Fast-Locking Screw Lock assemblies

(a) Procedure

The Screw Locks to be tested shall have a Security Pin, variants 6 defined in Paragraph 3, Figure 2 of this specification, in place on Male Side locked with Female Screw Lock assemblies. The Security Pin shall withstand an axial force, F ,of 40N without being dislodged from the Male Insert of Screw Lock assemblies.



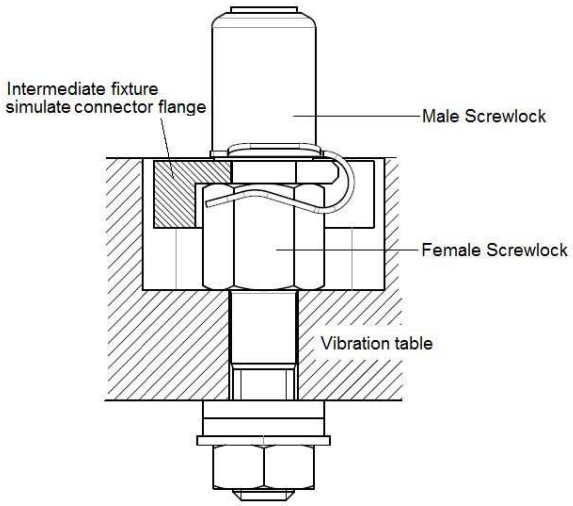
(b) Final inspection

The components shall be physically examined and shall show no evidence of physical damage

4.3.10 Mechanical Sequence on Sets of Couples Fast Locking assemblies

(a) Procedure

The Screw Lock shall be mated on the specific equipment show below and then submitted to Vibration Test defined in Paragraph 9.11 of ESCC 3401 Generic Specification.



(b) Intermediate inspection

The components shall be physically examined without being dismounted and shall show no evidence of physical damage.

Then the Screw Lock shall be submitted to Shock or Bump Test defined in Paragraph 9.11 of ESCC 3401 Generic Specification.

(c) Final inspection

The components shall be physically examined without being dismounted and shall show no evidence of physical damage.

4.3.11 Environmental Sequence on Sets of Couples Fast Locking assemblies

(a) Procedure

The Screw Lock shall be mated on equipment defined in Paragraph 4.3.10 of this specification and then submitted to Rapid Change of Temperature defined in Paragraph 9.16 of ESCC 3401 Generic Specification.

(b) Intermediate inspection

The components shall be physically examined without being dismounted and shall show no evidence of physical damage.

Then the Screw Lock shall be submitted to High Temperature Storage defined in Paragraph 9.21 of ESCC 3401 Generic Specification.

(c) Final inspection

The components shall be physically examined without being dismounted and shall show no evidence of physical damage.

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 components 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 Fast-Locking Screw Lock Assemblies

The body shall be made of brass with gold (0.7µm minimum) over copper (1µm minimum) plating.

The button shall be made of passivated stainless steel. The spring washer (as required) shall be made of beryllium copper with gold (0.7µm minimum) over copper (1µm minimum) plating. The spring and retaining clip (as required) shall be made of beryllium copper. The Security Pin shall be made of copper alloy with gold (0.7µm minimum) over copper (1µm minimum) plating.

4.4.2 Magnetism Level

The allowable value of magnetism shall not exceed that specified for the relevant level (see Para. 4.5.3.1).

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. The components are too small to accommodate any of the marking specified.

Each component in its primary package will be delivered with label.

The information to be marked on the label shall be as follows:

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

4.5.2 The ESCC Component Number

Each component shall be constituted as follows:

Example: 340108501B

- Detail Specification Number: 3401085
- Type Variant (see Table 1(a)): 01
- Testing Level: B (Note: this is mandatory, as Testing Level 'C' is not applicable).

4.5.3 Characteristics

The characteristics are:

(a) Magnetism Level.

4.5.3.1 Magnetism Level

The following codes shall be used for magnetism level:

CODE	DEFINITION
NMA	Magnetism Level: ≤ 2000 gamma
NMB	Magnetism Level: ≤ 200 gamma

4.5.4 Traceability Information

Traceability information shall be marked on label in accordance with ESCC Basic Specification No. 21700.

4.6 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 testing are scheduled 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 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.

TABLES 2, 3, 4 AND 5

Not applicable.

TABLE 6 – MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND ENDURANCE TESTING

No.	ESCC Generic Spec. No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Method and Conditions	Identification	Conditions		Min	Max	
01	Vibration	Para. 9.11	**Initial Measurements**					
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
			Coupling Nuts Locking Torque (if applicable)	Para. 4.3.3 of this Specification	Tqe	Table 1(b), Item 5		cm.daN
			Final Measurements					
			Locking / Unlocking Forces Drift	Para. 4.3.4 of this Specification	ΔF_{LO}, ΔF_{UN}	±25		%
			Coupling Nuts Locking Torque Drift (if applicable)	Para. 4.3.3 of this Specification	ΔTqe	±0.5		cm.daN
			Micro Cutting		-	-	1	µs
			Visual Examination		-	-	-	-
02	Shock or Bump	Para. 9.12	**Initial Measurements**					
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
			Final Measurements					
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
			Micro Cutting Full engagement		-	-	1	µs
			Visual Examination		-	-	-	-
03	Climatic Sequence	Para. 9.13	**Dry Heat**					
			Insulation Resistance	Not applicable				
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
			Damp Heat	**Immediately after test**				
			Insulation Resistance	Not applicable				
				After 1-24 hrs Recovery				
			External Visual Inspection	ESCC 3401 Para. 9.7	-	-	-	-
			Insulation Resistance	Not applicable				
			Voltage Proof Leakage Current	Not applicable				
04	Plating Thickness	Para. 9.14	Thickness		-	Para. 4.4.1 of this Specification		µm

No.	ESCC Generic Spec. No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Method and Conditions	Identification	Conditions		Min	Max	
05	Life Test Locking - Unlocking	Para. 4.3.5 of this Spec.	**Initial Measurements** Locking / Unlocking Forces **Final Measurements** Visual Examination Locking / Unlocking Forces Insulation Resistance Voltage Proof	 Para. 4.3.4 of this Specification Para. 4.3.4 of this Specification Not applicable Not applicable	 F_{LO}, F_{UN} - F_{LO}, F_{UN}	 Table 1(b), Items 3 & 4 - Table 1(b), Items 3 & 4	 - 	 N - N
06	Rapid Change of Temperature	Para. 9.16	**Initial Measurements** Locking / Unlocking Forces **Final Measurements** Visual Examination Locking / Unlocking Forces Insulation Resistance Voltage Proof Leakage Current Visual Examination	 Para. 4.3.4 of this Specification Para. 4.3.4 of this Specification Not applicable Not applicable	 F_{LO}, F_{UN} - F_{LO}, F_{UN}	 Table 1(b), Items 3 & 4 - Table 1(b), Items 3 & 4	 - 	 N - N
07	High Temperature Storage	Para. 9.21	**Initial Measurements** Locking / Unlocking Forces Low Level Contact Resistance **Final Measurements** Visual Examination Locking / Unlocking Forces Low Level Contact Resistance Drift Insulation Resistance Voltage Proof	 Para. 4.3.4 of this Specification Not applicable Para. 4.3.4 of this Specification Not applicable Not applicable Not applicable	 F_{LO}, F_{UN} - F_{LO}, F_{UN}	 Table 1(b), Items 3 & 4 - Table 1(b), Items 3 & 4	 - 	 N - N
08	Fast-Locking Screw Lock Retention on Shells (Note 2)	Para. 4.3.6 of this Spec.	Visual Examination	Screw Lock not damaged	-	-	-	-
09	Corrosion	Para. 9.22	Visual Examination		-	-	-	-
10	Maximum Torque Application (Note 3)	Para. 4.3.3 of this Spec.	Torque Value	Para. 4.3.3 of this Specification	Tqe	Table 1(b), Item 5		cm.daN
11	Clip Retention Inside Bushing (Note 4)	Para. 4.3.7 of this Spec.	Visual Examination	Clip inside Screw Lock not dislodged	-	-	-	-
12	Pull Test on mated Screw Lock assemblies (Note 5)	Para. 4.3.8 of this Spec.	**Initial Measurements** Locking / Unlocking Forces **Final Measurements** Visual Examination	 Para. 4.3.4 of this Specification	 F_{LO}, F_{UN} -	 Table 1(b), Items 3 & 4 -	 -	 N -

No.	ESCC Generic Spec. No. 3401		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Method and Conditions	Identification	Conditions		Min	Max	
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
13	Security Pin retention in Male Fast-Locking Screw Lock Assemblies (Note 5)	Para. 4.3.9 of this Spec.	**Initial Measurements** Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
			Final Measurements Visual Examination		-	-	-	-
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
14	Mechanical Sequence on sets of Couples Fast Locking assemblies (Note 5)	Para. 4.3.10 of this Spec.	**Initial Measurements** Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
			Final Measurements Visual Examination		-	-	-	-
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
15	Environmental Sequence on sets of Couples Fast Locking assemblies (Note 5)	Para. 4.3.11 of this Spec.	**Initial Measurements** Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N
			Final Measurements Visual Examination		-		-	-
			Locking / Unlocking Forces	Para. 4.3.4 of this Specification	F_{LO}, F_{UN}	Table 1(b), Items 3 & 4		N

NOTES:

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. Applicable to male variants.
3. Applicable to female and hybrid saver variants.
4. Applicable to female, saver and hybrid saver variants.
5. Locking / Unlocking forces measurements shall not be repeated in initial measurement when performed as final measurement of previous test.