



**CAPACITOR FILTERS, PI-TYPE, FEEDTHROUGH,  
ELECTROMAGNETIC INTERFERENCE  
SUPPRESSION, HERMETICALLY SEALED**

**BASED ON TYPE SFP100**

**ESCC Detail Specification No. 3008/028**

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## 1 GENERAL

### 1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for a Capacitor Filter, Pi-Type, Feedthrough, Electromagnetic Interference Suppression, Hermetically Sealed, based on Type SFP100. It shall be read in conjunction with ESCC Generic Specification No. 3008, the requirements of which are supplemented herein.

### 1.2 COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS

Variants of the basic type capacitor filters and the range of components 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 capacitor filters specified herein, are scheduled in Table 1(b).

### 1.4 PARAMETER DERATING INFORMATION

The parameter derating information applicable to the capacitor filters specified herein, is shown in Figure 1.

### 1.5 PHYSICAL DIMENSIONS

The physical dimensions of the capacitor filters specified herein, are shown in Figure 2.

### 1.6 FUNCTIONAL DIAGRAM

The functional diagram, showing lead identification, of the capacitor filters specified herein, is shown in Figure 3.

## 2 APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

- (a) ESCC Generic Specification No. 3008 for Capacitors, and Capacitor Filters, Feedthrough.
- (b) MIL-STD-202, Test Methods for Electronic and Electrical Component Parts.

## 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. In addition, the following abbreviations are used:

$V_T$  = Test Voltage.

**TABLE 1(a) – TYPE VARIANTS AND RANGE OF COMPONENTS**

(1) Variant (Note 1)	(2) Rated Voltage $U_R$ (V)		(3) Insulation Resistance $R_i$ (M $\Omega$ )		(4) Voltage Proof VP (V)	(5) Voltage Drop $V_{dr}$ (V)	(6) DC Resistance $R_s$ (m $\Omega$ )	(7) Rated Current $I_R$ (A)	(8) Capacitance C (pF)
	(a)	(b)	(a)	(b)					
	-55°C/+85°C	+125°C	-55°C/+85°C	+125°C					
01, 04	100	50	1000	100	250	0.2	20	10	160
02, 05	300	150	100	10	600	0.03	3	10	352000
03, 06	100	50	100	10	200	0.03	3	10	1312000

(1) Variant (Note 1)	(9) Insertion Loss ( $I_L$ ) (dB) With or Without Rated Current Applied					(10) Case Size (Note 1)
	100kHz	1.0MHz	10MHz	100MHz	1.0GHz	
	01, 04	-	1	-	12	
02, 05	8	2	70	70	70	2
03, 06	20	2	70	70	70	2

**NOTES**

1. See the table below and Figure 2 for physical characteristics:

Variant	Case Thread E	Lock-Washer
01 to 03	U: 1/4-28 UNF	Tooth
04 to 06	I: M6 x 0.75	Fan

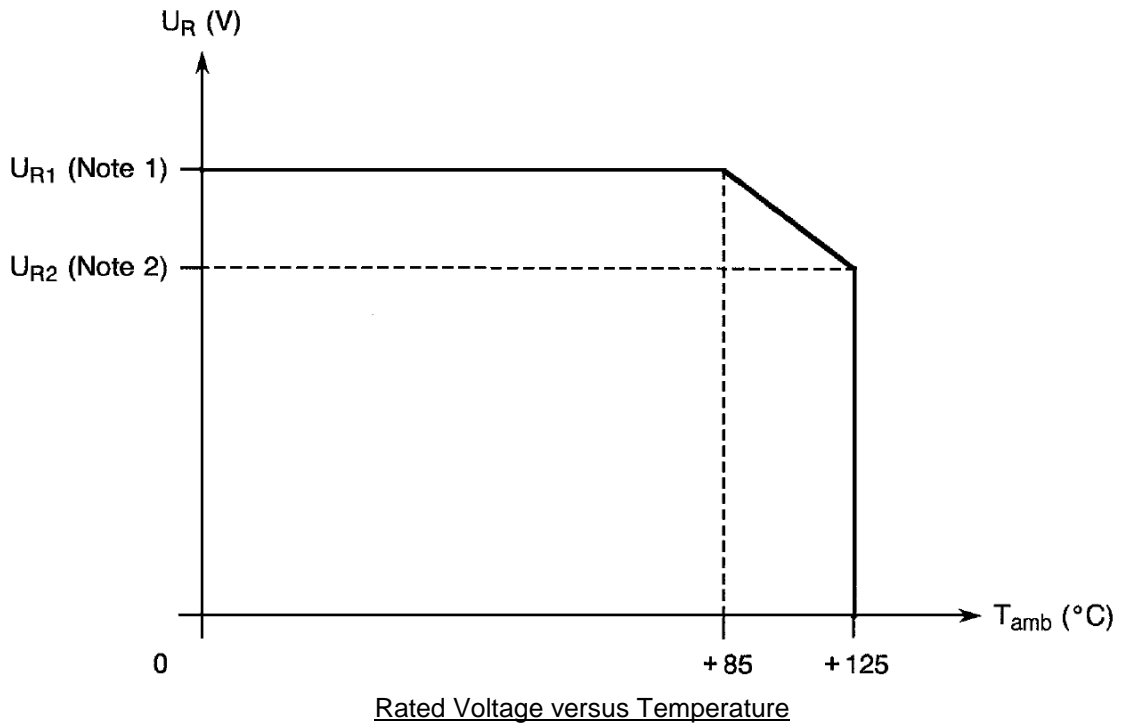
**TABLE 1(b) MAXIMUM RATINGS**

No.	Characteristic	Symbol	Maximum Ratings	Unit	Remarks
1	Rated DC Voltage	$U_R$	See Table 1(a) Column 2	V	Notes 1 and 2
2	Voltage Drop	$V_{dr}$	See Table 1(a) Column 5	mV	
3	DC Resistance	$R_s$	See Table 1(a) Column 6	m $\Omega$	
4	Rated Current	$I_R$	10	A	Note 3
5	Torque	$T_{qe}$	0.8	Nm	
6	Operating Temperature Range	$T_{op}$	-55 to +125	°C	$T_{amb}$
7	Storage Temperature Range	$T_{stg}$	-55 to +125	°C	
8	Soldering Temperature	$T_{sol}$	+260	°C	Note 4

**NOTES:**

- For derating at  $T_{amb} > 85^\circ\text{C}$ , see Figure 1.
- The addition of DC applied voltage and ripple voltage shall never exceed the rated DC voltage.
- DC and low frequency.
- Duration 10 seconds maximum at a distance of not less than 2mm from the body and the same lead shall not be resoldered until 3 minutes have elapsed.

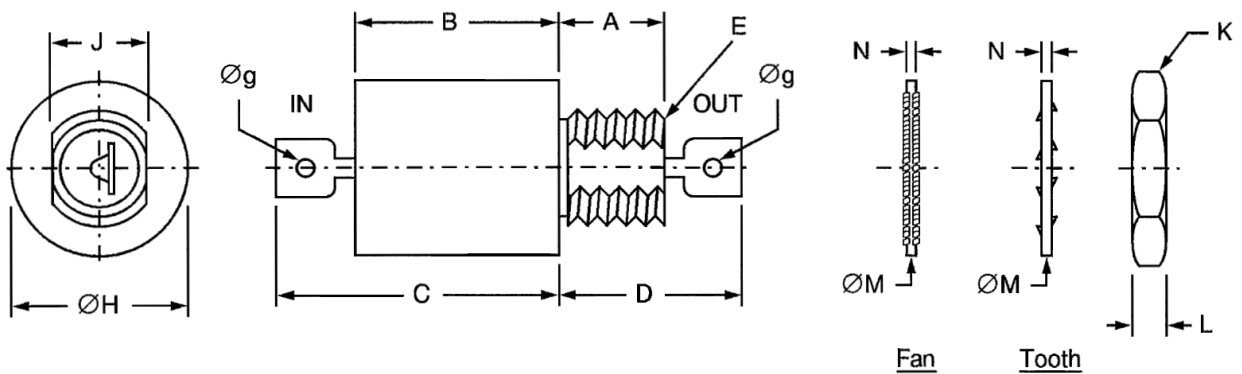
**FIGURE 1 - PARAMETER DERATING INFORMATION**



**NOTES**

1. See  $U_{R1}$  Voltage value for each variant on Table 1(a), Column 2(a).
2. See  $U_{R2}$  Voltage value for each variant on Table 1(a), Column 2(b).

**FIGURE 2 - PHYSICAL DIMENSIONS**



Symbol	Case Size 1		Case Size 2		Notes
	Millimetres		Millimetres		
	Min	Max	Min	Max	
A	5.1	5.2	5.1	5.2	
B	12	12.3	4.5	5.3	1
C	-	16.3	7	9.3	1, 2
D	-	9	7	9	1, 2
E	See Table 1(a)		See Table 1(a)		Thread
Øg	1.50		1.50		

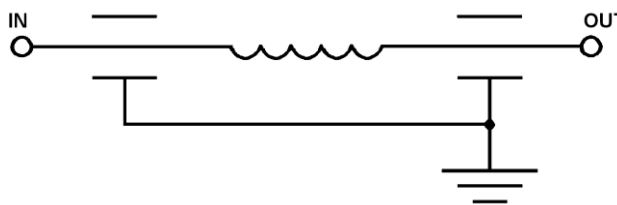


Symbol	Case Size 1		Case Size 2		Notes
	Millimetres		Millimetres		
	Min	Max	Min	Max	
ØH	9.7	9.9	9.7	9.9	
J	4.9	5.1	4.9	5.1	
K	-	8	-	8	Across flats
L	-	2.5	-	2.5	
ØM	-	10.2	-	10.2	Variants 01 to 03
	-	9.4	-	9.4	Variants 04 to 06
N	-	0.6	-	0.6	Variants 01 to 03
	-	0.4	-	0.4	Variants 04 to 06

**NOTES**

1. Lead finish shall commence not more than 1.5mm from encapsulant.
2. The terminals are defined as rigid.

**FIGURE 3 - FUNCTIONAL DIAGRAM**



**4 REQUIREMENTS**

**4.1 GENERAL**

The complete requirements for procurement of the components specified herein are stated in this specification and ESCC Generic Specification No. 3008 for Capacitors and Capacitor Filters, Feedthrough. 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)**

- (a) Para. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

#### 4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

- (a) Para. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

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

- (a) Para. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

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

- (a) Para. 9.7, External Visual Inspection: For variants with a silver plated case, a change of shade is acceptable.

### 4.3 MECHANICAL REQUIREMENTS

#### 4.3.1 Dimension Check

The dimensions of the components specified herein shall be verified in accordance with the requirements set out in Para. 9.5 of ESCC Generic Specification No. 3008 and they shall conform to those shown in Figure 2 of this specification.

#### 4.3.2 Weight

The maximum weight of the components specified herein shall be 10 grammes.

#### 4.3.3 Robustness of Terminations

The requirements for the robustness of terminations tests are specified in Section 9 of ESCC Generic Specification No. 3008. The leads are defined as "Rigid".

- Test Ua1, Tensile: The load shall be 20N.

#### 4.3.4 Solderability

The requirements for solderability testing are specified in Section 9 of ESCC Generic Specification No. 3008.

Test Method 1 shall apply and a thermal screen of 1.6mm may be used. The terminal shall be immersed up to the terminal slot which shall be fully filled.

#### 4.3.5 Seal Test

The requirements for seal testing are specified in Section 9 of ESCC Generic Specification No. 3008.

The limit for fine leak shall be  $5 \cdot 10^{-3}$  Pa.cm<sup>3</sup>/s [ $5 \cdot 10^{-8}$  bar.cm<sup>3</sup>/s].

### 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 Case

The case shall be silver plated brass and hermetically sealed with glass to metal sealing the filter element.

#### 4.4.2 Lead Material and Finish

The lead material shall be Type 'G' with Type '4' finish in accordance with the requirements of ESCC Basic Specification No. 23500.

#### 4.4.3 Accessories

Nut: As per Figure 2, brass, silver-plated.

Lock-Washer: As per Figure 2, bronze, silver-plated.

### 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) Lead Identification
- (b) The ESCC Component Number.
- (c) Traceability Information.

#### 4.5.2 Lead Identification

Not applicable.

#### 4.5.3 The ESCC Component Number

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

Example: 300802801B

- Detail Specification Number: 3008028
- Type Variant (see Table 1(a)): 01
- Testing level (B or C, as applicable): 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 at room temperature are scheduled in Table 2. Unless otherwise specified, measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .

#### 4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3. Measurements shall be performed at  $T_{amb} = +125 (+0 -5)^{\circ}\text{C}$  and  $-55 (+5 -0)^{\circ}\text{C}$  respectively.

4.6.3 Circuits for Electrical Measurements (Figure 4)  
Not applicable.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ . The parameter drift values ( $\Delta$ ) applicable to the parameters scheduled shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit value specified in Table 2 shall not be exceeded.

4.7.2 Conditions for Burn-in

The requirements for burn-in are specified in Section 7 of ESCC Generic Specification No. 3008. The conditions for burn-in shall be as specified in Table 5(a) of this specification.

4.7.3 Electrical Circuits for Burn-in (Figure 5)

Not applicable.

**TABLE 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE – DC PARAMETERS**

No.	Characteristics	Symbol	ESCC 3008 Test Method	Test Conditions	Limits		Unit
					Min	Max	
1	Voltage Drop	$V_{dr}$	Para. 9.4.1.5	$I_R = 10A$	-	Note 1	V
2	Voltage Proof	VP	Para. 9.4.1.2		Note 2	-	V
3	Insulation Resistance	Ri	Para. 9.4.1.3	Para. 9.4.1.3	Note 3	-	MΩ

**NOTES**

1. See Column 5 of Table 1(a).
2. See Column 4 of Table 1(a).
3. See Column 3(a) of Table 1(a).

**TABLE 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE – AC PARAMETERS**

No.	Characteristics	Symbol	ESCC 3008 Test Method	Test Conditions	Limits		Unit
					Min	Max	
4	Insertion Loss	$I_{L1}$	Para. 9.4.1.4	f = 100kHz Note 1	Note 2	-	dB
5	Insertion Loss	$I_{L2}$	Para. 9.4.1.4	f = 1.0MHz Note 3	Note 2	-	dB
6	Insertion Loss	$I_{L3}$	Para. 9.4.1.4	f = 10MHz Note 1	Note 2	-	dB
7	Insertion Loss	$I_{L4}$	Para. 9.4.1.4	f = 100MHz Note 3	Note 2	-	dB
8	Insertion Loss	$I_{L5}$	Para. 9.4.1.4	f = 1.0GHz Note 1	Note 2	-	dB
9	Capacitance	C	Para. 9.4.1.1	Para. 9.4.1.1	Note 4	-	pF

**NOTES**

1. Measurements at rated current to be made only during Chart IV testing in Subgroups II or III. Measurements without load current to be made during Charts II, III and V.
2. See Column 9 of Table 1(a).
3. Measurements at this frequency to be made only during Chart IV testing.
4. See Column 8 of Table 1(a).

**TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES**

No.	Characteristics	Symbol	ESCC 3008 Test Method	Test Conditions (Note 1)	Limits		Unit
					Min	Max	
3	Insulation Resistance	Ri	Para. 9.4.1.3	Para. 9.4.1.3 Note 2	Note 3	-	MΩ
4	Insertion Loss	$I_{L1}$	Para. 9.4.1.4	f = 100kHz No Current	Note 4	-	dB
6	Insertion Loss	$I_{L3}$	Para. 9.4.1.4	f = 10MHz No Current	Note 4	-	dB
8	Insertion Loss	$I_{L5}$	Para. 9.4.1.4	f = 1.0GHz No Current	Note 4	-	dB

**NOTES**

1. If more than 20 units have to be measured, the measurement shall be performed on a sample basis in accordance with Inspection Level I, Table IIA, AQL = 1% of IEC Publication No. 410.
2. Insulation resistance is to be performed only at high temperature.
3. See Column 3(b) of Table 1(a).
4. See Column 9 of Table 1(a).

**FIGURE 4 – CIRCUITS FOR ELECTRICAL MEASUREMENTS**

Not applicable.

**TABLE 4 – PARAMETER DRIFT VALUES**

No.	Characteristics	Symbol	Spec. and/or Test Method	Test Conditions	Change Limits ( $\Delta$ )	Unit
9	Capacitance Change	$\Delta C/C$	As per Table 2	As per Table 2	$\pm 10$	%

**TABLE 5(A) – CONDITIONS FOR BURN-IN TESTS**

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	$T_{amb}$	+125 (+0 -3)	$^{\circ}C$
2	Test Voltage	$V_T$	2 x $U_R$ at +125 $^{\circ}C$ Note 1	V

**NOTES**

1. Applied between one terminal and the case. See Column 2(b) of Table 1(a) for value of  $U_R$ .

**TABLE 5(b) – CONDITIONS FOR OPERATING LIFE TESTS**

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	$T_{amb}$	+125 (+0 -3)	$^{\circ}C$
2	Test Voltage	$V_T$	2 x $U_R$ at +125 $^{\circ}C$ Note 1	V
3	Rated Current	$I_R$	10 Note 2	A

**NOTES**

1. Applied between one terminal and the case. See Column 2(b) of Table 1(a) for value of  $U_R$ .
2. To flow between the terminals.

**FIGURE 5 – ELECTRICAL CIRCUIT FOR BURN-IN AND OPERATING LIFE TESTS**

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHART IV AND V OF ESCC GENERIC SPECIFICATION NO. 3008)

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  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .

4.8.2 Measurements and Inspections at Intermediate Points During Endurance Tests

The parameters to be measured and inspections to be performed at intermediate points during endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .

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 testing are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .

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

The requirements for operating life test are specified in Section 9 of ESCC Generic Specification No. 3008. The conditions for operating life testing shall be as specified in Table 5(b) of this specification.

4.8.5 Electrical Circuit for Operating Life Tests (Figure 5)

Not applicable.

**TABLE 6 – MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING**

No.	ESCC Generic Spec. No. 3008		Measurements and Inspections		Symbols	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min	Max	
01	Seal Test (Hermetically Sealed)	Para. 9.6 and Para 4.3.5 of this spec.	Gross Leak Fine Leak	ESCC No. 3008 Para. 9.6.1 ESCC No. 3008 Para. 9.6.2	- -	- -	- -	
02	External Visual Inspection	Para. 9.7 and Paras 4.2.4 and 4.2.5 of this spec	<b>Final Measurements</b> Visual Inspection	ESCC No. 20500	-	-	-	
03	Temperature Rise	Para. 9.9	Temperature Rise	Rated Current (3)	-	-	25	°C
04	Shock	Para. 9.10	<b>Measurements during Tests</b>	100% U <sub>R</sub> (2) applied No Open or Short Circuits > 0.1ms	-	-	-	
			<b>Final Measurements</b> Visual Examination	No Mechanical Damage	-	-	-	
			Insertion Loss	Table 2 Item 4 to 8	I <sub>L</sub>	Table 2	-	
05	Vibration	Para. 9.11	<b>Measurements during Tests</b>	Rated Current (3) and 100% U <sub>R</sub> (2) applied	-	-	-	
			<b>During Last Cycle</b>	No Open or Short Circuits > 0.1ms	-	-	-	
			<b>Final Measurements</b> Visual Examination	No Mechanical Damage	-	-	-	
			Insertion Loss	Table 2 Item 4 to 8	I <sub>L</sub>	Table 2	-	
06	Accelerated Damp Heat	Before tests 10 cycles of Para. 9.2 Para. 9.12	<b>Final Measurements</b> Visual Examination	After recovery of 4 to 24 hrs No corrosion, damage or obliteration of marking	-	-	-	
			Voltage Proof	Table 2 Item 2	VP	90% U <sub>R</sub> (2)	-	
			Insulation Resistance	Table 2 Item 3	Ri	(4)	-	
			Insertion Loss	Table 2 Item 4 to 8	I <sub>L</sub>	Table 2	-	



No.	ESCC Generic Spec. No. 3008		Measurements and Inspections		Symbols	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min	Max	
07	Low Air Pressure	Para. 9.13	<b>Measurements during Tests</b> Voltage Proof Visual Examination  <b>Final Measurements</b> Visual Examination	During last 5 minutes Table 2 Item 2 No breakdown, flashover, deformation or seepage  No breakdown, flashover, deformation or seepage	VP - -	125% U <sub>R</sub> (2) - -	- - -	
08	Robustness of Terminations	Para. 9.14 and Para. 4.3.3. of this spec	<b>Final Measurements</b> Visual Examination Voltage Drop	No damage Table 2 Item 1	- V <sub>dr</sub>	- -	- Table 2	
09	Immersion	Before tests 10 cycles of Para. 9.2 Para. 9.15	<b>Final Measurements</b> Visual Examination  Voltage Proof Insulation Resistance Insertion Loss	After recovery of 4 to 24 hrs No obliteration of marking and harmful corrosion Table 2 Item 2 Table 2 Item 3 Table 2 Item 4 to 8	- VP Ri I <sub>L</sub>	- 90% U <sub>R</sub> (2) (4) Table 2	- - - -	
10	Overload	Para. 9.16	<b>Final Measurements</b> Insulation Resistance Voltage Drop Visual Examination	140% of Rated Current (3) for 15 mins min.  Table 2 Item 3 Table 2 Item 1 No damage	- Ri V <sub>dr</sub> -	- Table 2 - -	- - Table 2 -	
11	Resistance to Soldering Heat	Para. 9.17	<b>Final Measurements</b> Visual Examination Insulation Resistance Insertion Loss	After recovery of 1 to 2 hrs No damage Table 2 Item 3 Table 2 Item 4 to 8	- Ri I <sub>L</sub>	- Table 2 Table 2	- - -	
12	Solderability	Para. 9.18 and Para 4.3.4 of this spec.	<b>Final Measurements</b> Visual Examination	IEC No. 68-2-20 Para. 4.6.4, 4.7.4 or 4.9.3	-	-	-	

No.	ESCC Generic Spec. No. 3008		Measurements and Inspections		Symbols	Limits		Unit
	Environmental and Endurance Tests (1)	Test Method and Conditions	Identification	Conditions		Min	Max	
13	Operating Life	Para. 9.19	<b>Initial Measurements</b> Capacitance  <b>During Tests</b>  <b>Intermediate Measurements</b> Insulation Resistance  Voltage Proof Insulation Resistance Insertion Loss Capacitance Change  <b>Final Measurements</b> Insulation Resistance  Voltage Proof Insulation Resistance Insertion Loss Capacitance Change	Table 2 Item 9  No Open or Short Circuit  Table 3 Item 3  After 24 hrs recovery Table 2 Item 2 Table 2 Item 3 Table 2 Item 4 to 8 Table 2 Item 9  Table 3 Item 3  After 24 hrs recovery Table 2 Item 2 Table 2 Item 3 Table 2 Item 4 to 8 Table 2 Item 9	C  -  Ri  VP Ri I <sub>L</sub> ΔC/C  Ri  VP Ri I <sub>L</sub> ΔC/C	Record Values  -  Table 3  90% U <sub>R</sub> (2) (5) Table 2 -  Table 3  90% U <sub>R</sub> (2) (5) Table 2 -	-  -  -  Table 4  -  -  -  Table 4	
14	Corrosion	Para. 9.20	<b>Final Measurements</b> Visual Examination	No corrosion, damage or obliteration of marking	-	-	-	
15	Permanence of Marking	Para. 9.21	<b>Final Measurements</b> Visual Examination	No corrosion or obliteration of marking	-	-	-	
16	Damp Heat (Non-hermetically Sealed)	Para. 9.24	Not applicable					

**NOTES**

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. For U<sub>R</sub>, see Column 2(a) of Table 1(a).
3. For I<sub>R</sub>, see Column 7 of Table 1(a).
4. Greater than 10% of the value given in Table 2.
5. Greater than 50% of the value given in Table 2.

**APPENDIX A**  
**AGREED DEVIATIONS FOR EUROFARAD (F)**

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Paras. 4.2.2 and 4.2.3	(a) Para. 9.4.1.5, Voltage Drop: Voltage Drop may be performed as a DC Resistance measurement in accordance with MIL-STD-202, Method 303. In this case, the maximum value of DC Resistance (Rs) shall be as specified in Column 6 of Table 1(a).