CAPACITOR FILTERS, FEEDTHROUGH, ELECTROMAGNETIC INTERFERENCE SUPPRESSION, BASED ON TYPE 1270/712

ESCC Detail Specification No. 3008/001

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space components
coordination group

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		SCCG Chairman	ESA Director General or his Deputy
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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 3 and incorporates all modifications defined in Revisions 'A', 'B', 'C' and 'D' to Issue 3 and the changes agreed in the following DCR's:-		
		Cover page		None
		DCN		None
		Para. 4.2	: Requirements clarified	23804
		Table 6	: Rewritten and Seal Test entry added	23787
			: External Visual Inspection references expanded	23821

TABLE OF CONTENTS

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for a low pass, pi-section, co-axial, Capacitor Filters, Feedthrough, Electromagnetic Interference Suppression, based on Type 1270/712. It shall be read in conjunction with ESA/SCC Generic Specification No. 3008, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the basic type components specified herein, which are also 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 components specified herein, are as scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

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

1.5 PHYSICAL DIMENSIONS

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

1.6 FUNCTIONAL DIAGRAM

The functional diagram, showing lead identification, of the components 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) ESA/SCC Generic Specification No. 3008 for Capacitors and Capacitor Filters, Feedthrough.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply.

TABLE 1(a) - TYPE VARIANTS

Variant	Case	Figure	Lead Material and Finish
01	Metal	2	A10
02	Metal	2	A3 or A4

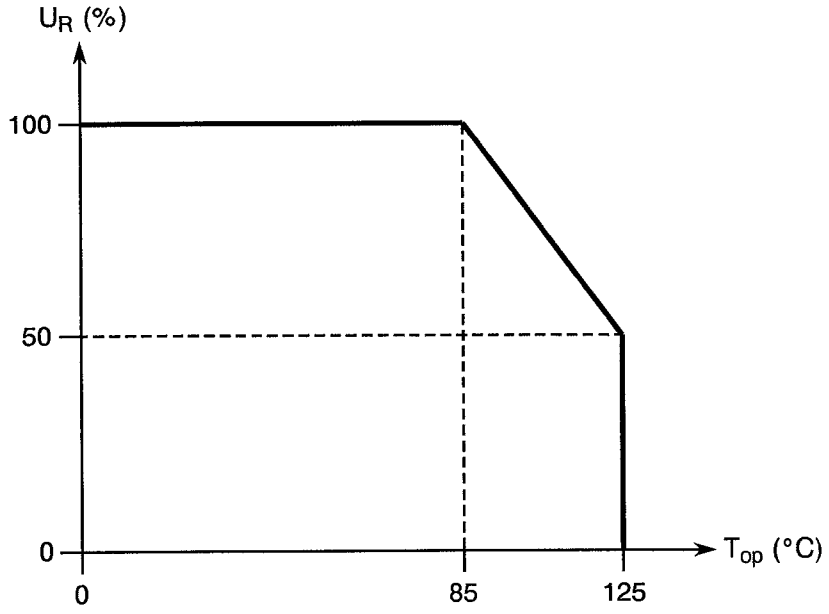
TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristic	Symbol	Maximum Ratings	Unit	Remarks
1	Rated d.c. Voltage	U_R	200	V	Note 1
2	Torque	T_{qe}	0.46	Nm	
3	Voltage Drop (d.c.)	V_{dr}	0.1	V	
4	d.c. and Low Frequency Current	I_{LF}	10	A	
5	R.F. Current	I_{RF}	0.25	Aac	Up to 1.0GHz
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 2

NOTES

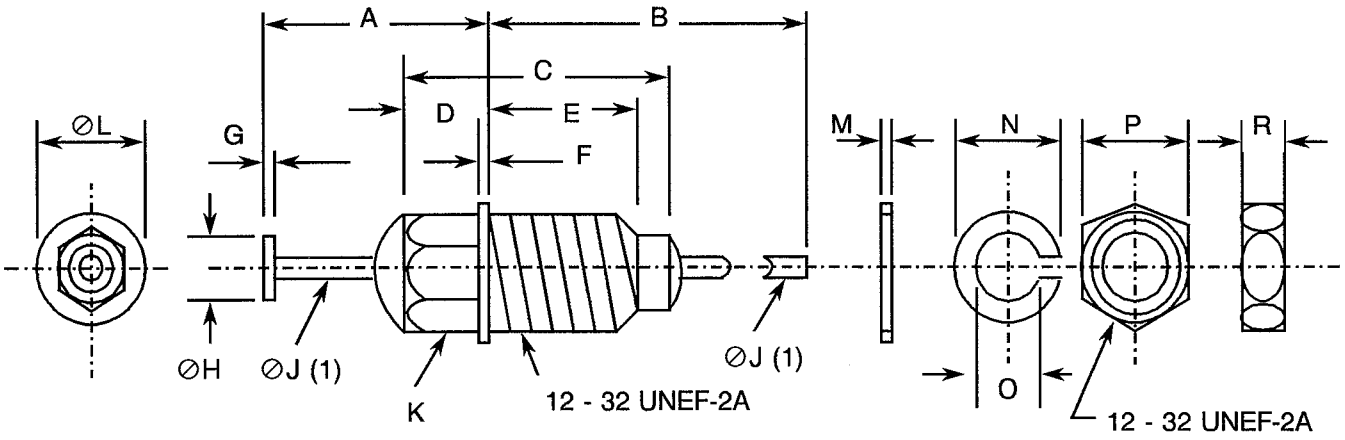
1. At $T_{amb} \leq +85°C$. For derating at $T_{amb} > 85°C$, see Figure 1.
2. Duration 10 seconds maximum at a distance of not less than 2 mm from the body and the same lead shall not be resoldered until 3 minutes have elapsed.

FIGURE 1 - PARAMETER DERATING INFORMATION



Rated Voltage versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS

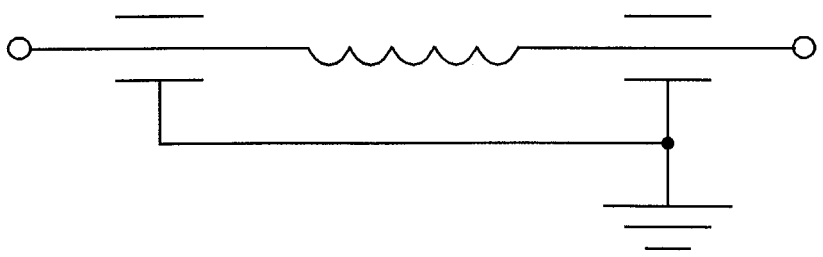


Symbol	Dimensions (mm)	
	Min.	Max.
A	7.9	9.5
B	22.6	24.2
C	11.5	12.3
D	3.6	4.4
E	6.0	6.6
F	0.6	1.2
G	0.4	0.6
⌀H	0.95	1.5
(⌀H - ⌀J)	0.25	-
⌀J	0.7	1.1
K	4.5	5.1
⌀L	6.0	6.7
M	1.1	1.3
N	6.8	7.1
O	5.5	5.9
P	6.0	6.7
R	1.8	2.1

NOTES

1. Lead finish shall commence not more than 1.5mm from encapsulant.

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 ESA/SCC 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 ESA/SCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

Para. 9.7, additionally the visual criteria for epoxy seals defined in ESA/SCC Basic Specification No. 2053000 under Para. 3.6 shall apply.

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)

None.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

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 ESA/SCC 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 2.0 grammes.

4.3.3 Robustness of Terminations

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

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 with potting encapsulant sealing the filter element.

4.4.2 Lead Material and Finish

The lead material shall be Type 'A' with either Type '3 or 4' or Type '10' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500. (See Table 1(a) for Type Variants).

4.4.3 Accessories

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

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

4.5 MARKING

4.5.1 General

The marking of components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700. Each component shall be marked in respect of:-

(a) Lead Identification.

(b) The SCC Component Number.

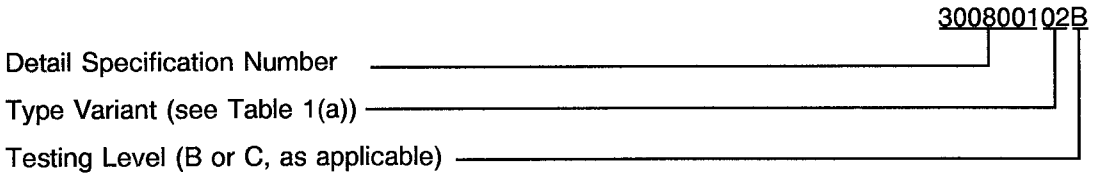
(c) Traceability Information.

4.5.2 Lead Identification

Not applicable.

4.5.3 The SCC Component Number

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



4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

4.5.5 Marking of Small Components

When it is considered that the component is too small to accommodate the marking as specified above, as much as space permits shall be marked. The order of precedence shall be as follows:-

(a) The SCC Component Number.

(b) Traceability Information.

The marking information, in full, shall accompany each component in its primary package.

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 $T_{amb} = +22 \pm 3$ °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 $T_{amb} = 125(+0-5)$ °C and $-55(+5-0)$ °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 as specified in Table 4 of this specification. Measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift values (Δ) applicable to the parameters scheduled shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit values 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 ESA/SCC Generic Specification No. 3008. The conditions for burn-in shall be as specified in Table 5 of this specification.

4.7.3 Electrical Circuit for Burn-in (Figure 5)

Not applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS

No.	Characteristics	Symbol	ESA/SCC 3008 Test Method	Test Conditions	Limits		Unit
					Min	Max	
1	Voltage Drop	V_{dr}	Para. 9.4.1.5	$I_{LF} = 10A$	-	0.1	V
2	Voltage Proof	VP	Para. 9.4.1.2	$V = 2.5U_R$	500	-	V
3	Insulation Resistance	Ri	Para. 9.4.1.3	Para. 9.4.1.3	10^4	-	MΩ

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - a.c. PARAMETERS

No.	Characteristics	Symbol	ESA/SCC 3008 Test Method	Test Conditions	Limits		Unit
					Min	Max	
4	Insertion Loss	I_{L1}	Para. 9.4.1.4	f = 50MHz No Current. (1) Rated Current. (1)	 50 45	 - -	dB
5	Insertion Loss	I_{L2}	Para. 9.4.1.4	f = 100MHz No Current. (1) (2) Rated Current. (1)	 50 47	 - -	dB
6	Insertion Loss	I_{L3}	Para. 9.4.1.4	f = 200MHz No Current. (1) (2) Rated Current. (1)	 60 57	 - -	dB
7	Insertion Loss	I_{L4}	Para. 9.4.1.4	f = 500MHz No Current. (1) Rated Current. (1)	 63 60	 - -	dB
8	Insertion Loss	I_{L5}	Para. 9.4.1.4	f = 1.0GHz No Current. (1) (2) Rated Current. (1)	 65 62	 - -	dB
9	Capacitance	C	Para. 9.4.1.1	f = 1000 ± 100 Hz V = 0.1 to 1.2 Vrms	5000	-	pF

NOTES

1. Measurement to be performed during Chart IV testing.
2. Measurement to be performed during Chart V testing.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125(+0-5) AND -55(+5-0) °C

No.	Characteristics	Symbol	ESA/SCC 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 T_{amb} = +125(+0-5) °C T_{amb} = -55(+5-0) °C T_{amb} = +85±3 °C	 10^3 10^4 10^3	 - - -	MΩ
5	Insertion Loss	I_{L2}	Para. 9.4.1.4	f = 100MHz No Current	50	-	dB
6	Insertion Loss	I_{L3}	Para. 9.4.1.4	f = 200MHz No Current.	60	-	dB
8	Insertion Loss	I_{L5}	Para. 9.4.1.4	f = 1.0GHz No Current.	65	-	dB

NOTES

1. Measurements shall be performed on a sample basis, LTPD 7 or less.

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 (Δ)	Unit
9	Capacitance Change	$\frac{\Delta C}{C}$	As per Table 2	As per Table 2	±20	%

TABLE 5 - CONDITIONS FOR BURN-IN AND OPERATING LIFE TESTS

No.	Characteristic	Symbol	Condition	Unit
1	Ambient Temperature	T_{amb}	+85 ±3	°C
2	Voltage	V	200 (1)	V
3	Current	I_{LF}	10 (2)	A

NOTES

1. Applied between one terminal and case.
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 (CHARTS IV AND V OF ESA/SCC 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 $T_{amb} = +22 \pm 3$ °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 $T_{amb} = +22 \pm 3$ °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 as scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °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 ESA/SCC Generic Specification No. 3008. The conditions for operating life testing shall be as specified in Table 5 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.	ESA/SCC GENERIC SPEC. NO. 3008		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Seal Test (Hermetically Sealed)	Para. 9.6	Not applicable					
02	External Visual Inspection	Para. 9.7 and Para. 4.2 of this spec.	**Final Measurements** Visual Inspection	ESA/SCC No. 20500	-	-	-	
03	Temperature Rise	Para. 9.9	Temperature Rise	Rated d.c. Current (3)	-	-	25	°C
04	Shock	Para. 9.10	**Measurements during Tests** **Final Measurements** Visual Examination Insertion Loss	100% U_R (2) applied No Open or Short Circuits >0.1ms No Mechanical Damage Table 2 Items 4 to 8	 - I_L	 - - Table 2	 - - -	
05	Vibration	Para. 9.11	**Measurements during Tests** During Last Cycle **Final Measurements** Visual Examination Insertion Loss	Rated d.c. Current (3) and 100% U_R (2) applied No Open or Short Circuits >0.1ms No Mechanical Damage Table 2 Items 4 to 8	 - - I_L	 - - Table 2	 - - -	
06	Accelerated Damp Heat	Before tests, 10 cycles of Para. 9.2 Para. 9.12	**Final Measurements** Visual Examination Voltage Proof Insulation Resistance Insertion Loss	After recovery of 4 to 24 hrs No corrosion or obliteration of marking Table 2 Item 2 Table 2 Item 3 Table 2 Items 4 to 8	 - VP Ri I_L	 - 90% U_R (2) 10^4 Table 2	 - - - -	
07	Low Air Pressure	Para. 9.13	**Measurements during Tests** Voltage Proof Visual Examination **Final Measurements** 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_R (2) - -	 - - -	
08	Robustness of Terminations	Para. 9.14 and Para. 4.3.3 of this spec.	**Final Measurements** Visual Examination Voltage Drop	 No damage Table 2 Item 1	 - V_{dr}	 - -	 - 0.1	
09	Immersion	Before tests, 10 cycles of Para. 9.2 Para. 9.15	**Final Measurements** 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 Items 4 to 8	 - VP Ri I_L	 - 90% U_R (2) 3×10^3 Table 2	 - - - -	

NOTES

1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.
2. For U_R, see Table 1(b), Item 1.
3. For I_{LF}, see Table 1(b), Item 4.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING (CONT'D)

NO.	ESA/SCC GENERIC SPEC. NO. 3008		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
10	Overload	Para. 9.16		140% of Rated d.c. Current (3) for 15 mins min.				
			Final Measurements					
			Insulation Resistance	Table 2 Item 3	Ri	10^4	-	
			Voltage Drop	Table 2 Item 1	V_{dr}	-	0.1	
			Visual Examination	No damage	-	-	-	
11	Resistance to Soldering Heat	Para. 9.17	**Final Measurements**	After recovery of 1 to 2 hrs				
			Visual Examination	No damage	-	-	-	
			Insulation Resistance	Table 2 Item 3	Ri	10^4	-	
			Insertion Loss	Table 2 Items 4 to 8	I_L	Table 2	-	
12	Solderability	Para. 9.18	**Final Measurements**					
			Visual Examination	IEC No. 68-2-20	-	-	-	
13	Operating Life	Para. 9.19	**During Tests**	No Open or Short Circuit	-	-	-	
			Intermediate Measurements					
			Insulation Resistance	Table 3 Item 3	Ri	10^3	-	
				After 24 hrs recovery				
			Voltage Drop	Table 2 Item 1	Vdr	-	0.1	
			Voltage Proof	Table 2 Item 2	VP	90% U_R (2)	-	
			Insulation Resistance	Table 2 Item 3	Ri	10^4	-	
			Insertion Loss	Table 2 Items 4 to 8	I_L	Table 2	-	
			Capacitance	Table 2 Item 9	C	5000	-	
			Final Measurements					
			Insulation Resistance	Table 3 Item 3	Ri	10^3	-	
				After 24 hrs recovery				
			Voltage Drop	Table 2 Item 1	Vdr	-	0.1	
			Voltage Proof	Table 2 Item 2	VP	90% U_R (2)	-	
			Insulation Resistance	Table 2 Item 3	Ri	10^4	-	
			Insertion Loss	Table 2 Items 4 to 8	I_L	Table 2	-	
			Capacitance	Table 2 Item 9	C	5000	-	
14	Corrosion	Para. 9.20	**Final Measurements**					
			Visual Examination	No corrosion, damage or obliteration of marking	-	-	-	
15	Permanence of Marking	Para. 9.21	**Final Measurements**	No corrosion or	-	-	-	
			Visual Examination	obliteration of marking				
16	Damp Heat (Non-hermetically Sealed)	Para. 9.24	**Final Measurements**	After 4 hrs recovery				
			Visual Examination	No cracking or encapsulant separation	-	-	-	
			Insulation Resistance	Table 2 Item 3	Ri	10^4	-	

NOTES: See Page 16.