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Pages 1 to 34

CAPACITORS, FIXED, CHIPS,

CERAMIC DIELECTRIC, TYPES I AND II

ESA/SCC Generic Specification No. 3009

SCC

space components
coordination group

Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 6	May 1997		
Revision 'A'	July 1998		
Revision 'B'	April 1999		
Revision 'C'	August 2001		

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 5 and incorporates all modifications defined in Revisions 'A' and 'B' to Issue 5 and the changes agreed by the following DCRs which complete the implementation of Policy DCR 21107:-		
		Cover Page		None
		DCN		None
		Para. 4.1	: Second paragraph amended	23853
			: New paragraph added	23853
		Para. 4.1.3	: Second sentence amended	23853
		Para. 4.1.4	: Text amended	23853
		Chart I	: "(1)" added to Lot Acceptance Boxes and Note 1 added	23853
		Para. 8.2.1	: In the last paragraph, both sentences amended	23853
		Para. 8.2.3	: Text added to the beginning of (e)	23853
		Para. 8.4	: Last paragraph amended	23853
		Chart II	: Rapid change to Temperature Box deleted	21103
		Chart IV	: In Subgroup II, Para. 9.7.2 reference amended to "9.7"	21103
		Chart V	: In Level 1, Para. 9.7.2 reference amended to "9.7"	21103
		Para. 9	: Text added	23853
		Para. 9.7.1	: Paragraph deleted in toto	21103
		Para. 9.7.2	: Title deleted	21103
		Para. 9.8.5	: Paragraph deleted in toto	21104
		Para. 9.8.6	: Renumbered to "9.8.5"	21104
		Para. 9.8.7	: Renumbered to "9.8.6"	21104
		Para. 10.1	: "(when applicable)" added to (h)	23853
		Para. 10.1.2	: Existing text deleted and new text added	23853
		Para. 10.1.3	: Existing text deleted and new text added	23853
		Para. 10.1.4	: New paragraph added	23853
		Para. 10.2	: (e) amended	23853
		Para. 10.3	: First sentence amended	23853
		Para. 10.6	: Rapid change of temperature deleted	None
			: Second paragraph, second sentence amended	23853
			: Last paragraph deleted	23853
		Para. 10.7.1	: In the second sentence, "provided" replaced by "recorded"	23853
		Para. 10.7.2	: In the text, "provided" replaced by "prepared"	23853
		Para. 11	: (b), "(when applicable)," added after "testing"	23853
			: In the last sentence, ",when requested" added after "copied"	23853
'A'	Jul. '98	P1. Cover page		None
		P2. DCN		None
		P4. T of C	: Para. 9.2 entry added	None
			: Paras. 9.2.1 and 9.2.2 entries deleted	None
		P18. Chart II	: Para. 9.2.1 Box deleted in toto	221473
			: Para. 9.2.2 Box changed to "9.2" and amended	221473
			: Para. 9.4.3 Box, Note reference amended	221473
			: Note 1 deleted and remaining notes renumbered	221473
		P22. Para. 9.2	: Heading deleted	221473
		Para. 9.2.1	: Paragraph deleted in toto	221473
		Para. 9.2.2	: Renumbered as "9.2"	221473
		P28. Para. 9.11	: First sentence amended	221473

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
'B'	Apr. '99	P1. Cover page		None
		P2A. DCN	: Page added	None
		P15. Para. 8.2.1	: New second sentence added to last paragraph	21111
		P30. Para. 10.1.2.1	: Item (b), "PDA figure and" deleted from text	21119
			: Item (c) rewritten	21119
		P31. Para. 10.1.3.1	: Item (a), "(including PDA figure)" deleted	21119
'C'	Aug. '01	P1. Cover page		None
		P2A. DCN		None
		P24. Para. 9.4.1.4.1	: In the Table, the first rating amended and a new second rating added	21190
		P27. Para. 9.10.2	: In the Table, the first rating amended and a new second rating added	21190

TABLE OF CONTENTS

1. INTRODUCTION

1.1 SCOPE

This specification defines the general requirements for the qualification approval, procurement, including lot acceptance testing, and delivery of Capacitors, Fixed, Chips, Ceramic Dielectric, Types I and II, for space applications.

This specification contains the appropriate inspection and test schedules and also specifies the data documentation requirements.

1.2 APPLICABILITY

This specification is primarily applicable to the granting of qualification approval to a component in accordance with ESA/SCC Basic Specification No. 20100 and the procurement of such components from qualified Manufacturers.

2. APPLICABLE DOCUMENTS

The following documents form part of, and shall be read in conjunction with, this specification. The relevant issues shall be those in effect on the date of placing the purchase order.

2.1 ESA/SCC SPECIFICATIONS

No. 20100, Requirements for the Qualification of Standard Electronic Components for Space Application.

No. 20400, Internal Visual Inspection.

No. 20500, External Visual Inspection.

No. 20600, Preservation, Packaging and Despatch of SCC Electronic Components.

No. 21300, Terms, Definitions, Abbreviations, Symbols and Units.

No. 21700, General Requirements for the Marking of SCC Components.

No. 22800, ESA/SCC Non-conformance Control System.

No. 23400, Microsection Examination, Preparation and Evaluation of Capacitors, Fixed, Ceramic, Leaded and Chips.

No. 24600, Minimum Quality System Requirements.

No. 24800, Resistance to Solvents of Marking, Materials and Finishes.

With the exception of ESA/SCC Basic Specifications Nos. 20100, 21700, 22800 and 24600, where Manufacturers' specifications are equivalent to, or more stringent than, the ESA/SCC Basic Specifications listed above, they may be used in place of the latter, subject to the approval of the appropriate Qualifying Space Agency.

Such replacements shall be clearly identified in the applicable Process Identification Document (P.I.D.) and listed in an Appendix to the appropriate Detail Specification.

Unless otherwise stated herein, references within the text of this specification to "the Detail Specification" shall mean the relevant ESA/SCC Detail Specification.

2.2 OTHER (REFERENCE) DOCUMENTS

IEC Publication No. 68, Basic Environmental Testing Procedures.

IEC Publication No. 384, Fixed Capacitors for Use in Electronic Equipment.

IEC Publication No. 410, Sampling Plans and Procedures for Inspection by Attributes.

ESA PSS-01-702, A Thermal Vacuum Test for the Screening of Space Materials.

2.3 ORDER OF PRECEDENCE

For the purpose of interpretation and in case of conflict with regard to documentation, the following order of precedence shall apply:-

(a) ESA/SCC Detail Specification.

(b) ESA/SCC Generic Specification.

(c) ESA/SCC Basic Specification.

(d) Other documents, if referenced herein.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

The terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply.

4. REQUIREMENTS

4.1 GENERAL

The test requirements for qualification approval of a component shall comprise final production tests (see Chart II), burn-in and electrical measurements to testing level "B" (see Chart III) and qualification testing (see Chart IV).

The test requirements for procurement of components shall comprise final production tests (Chart II), burn-in and electrical measurements to testing level "B" or "C" as required (Chart III) together with, when applicable, a level of lot acceptance testing (see Chart V) to be specified by the Orderer.

If a Manufacturer elects to eliminate a final production test by substituting an in-process control or statistical process control procedure, the Manufacturer is still responsible for delivering components that meet all of the performance, quality and reliability requirements defined in this specification and the Detail Specification.

4.1.1 Specifications

For qualification approval, procurement (including lot acceptance testing) and delivery of components in conformity with this specification, the specifications listed in Section 2 of this document shall apply in total unless otherwise specified herein or in the Detail Specification.

4.1.2 Conditions and Methods of Test

The conditions and methods of test shall be in accordance with this specification, the ESA/SCC Basic Specifications referenced herein and the Detail Specification.

4.1.3 Manufacturer's Responsibility for Performance of Tests and Inspections

The Manufacturer shall be responsible for the performance of tests and inspections required by the applicable specifications. These tests and inspections shall be performed at the plant of the Manufacturer of the components unless it is agreed by the Qualifying Space Agency prior to commencing qualification testing, or procurement, to use an approved external facility.

4.1.4 Inspection Rights

The Qualifying Space Agency (for qualification approval or for a procurement) reserves the right to monitor any of the tests and inspections scheduled in the applicable specifications.

4.2 QUALIFICATION APPROVAL REQUIREMENTS ON A MANUFACTURER

To obtain and maintain the qualification approval of a component, or family of components, a Manufacturer shall satisfy the requirements of ESA/SCC Basic Specification No. 20100.

4.3 DELIVERABLE COMPONENTS

Components delivered to this specification shall be processed and inspected in accordance with the relevant Process Identification Document (P.I.D.). Each delivered component shall be traceable to its production lot. Components delivered to this specification shall have completed satisfactorily all tests to the testing level and lot acceptance level specified in the purchase order (see Para. 4.3.2).

ESA/SCC qualified components delivered to this specification shall be produced from lots that are capable of passing all tests, and sequences of tests, that are defined in Charts IV and V. The Manufacturer shall not knowingly supply components that cannot meet this requirement. In the event that, subsequent to delivery and prior to operational use, a component is found to be in a condition such that it could not have passed these tests at the time of manufacture, this shall be grounds for rejection of the delivered lot.

Components failing inspections and tests of the higher testing level (i.e level "B") shall not be supplied against any order for components of the lower testing level.

4.3.1 Lot Failure

Lot failure may occur during final production tests (Chart II), burn-in and electrical measurements (Chart III), qualification testing (Chart IV) or lot acceptance testing (Chart V).

Should such failure occur, the non-conformance procedure shall be initiated in accordance with ESA/SCC Basic Specification No. 22800.

Should such failure occur during procurement, the Manufacturer shall notify the Orderer by telex within 2 working days, giving details of the number and mode of failure and the suspected cause.

In the case where qualification approval has been granted to the component, he shall, at the same time by the same means, inform the Qualifying Space Agency in order that the latter may consider its implications.

No further testing shall be performed on the failed components except on instruction from the Orderer. The Orderer shall inform the Manufacturer and the Qualifying Space Agency within 2 working days of receipt of the telex, by the same means, what action shall be taken.

In the case when lot failure occurs during qualification testing, the Manufacturer shall immediately notify the appropriate Qualifying Space Agency who will define a course of action to be followed. No further testing shall be performed on the failed components.

4.3.2 Testing and Lot Acceptance Levels

This specification defines 2 levels of testing severity which are designated by the letters "B" and "C" (see Chart I) and 3 levels of lot acceptance testing (see Chart V).

The lot acceptance levels are designated 1, 2 and 3 and are comprised of tests as follows:-

Level 3 (LA3) - Electrical Subgroup.

Level 2 (LA2) - Endurance Subgroup
plus Electrical Subgroup.

Level 1 (LA1) - Environmental and Mechanical Subgroup
plus Endurance Subgroup
plus Electrical Subgroup.

The required testing level and lot acceptance level shall both be specified in a purchase order.

4.4 MARKING

All components procured and delivered to this specification from a source qualified according to ESA/SCC Basic Specification No. 20100 shall be marked in accordance with ESA/SCC Basic Specification No. 21700. Thus, they shall bear the ESA symbol to signify their conformance to the ESA/SCC qualification approval requirements and full compliance with the requirements of this specification and the Detail Specification.

Components procured from sources which are not ESA/SCC qualified, provided that they fully comply with the procurement requirements of this specification and the Detail Specification, may bear the SCC marking **with the exception of the ESA symbol**.

4.5 MATERIALS AND FINISHES

All non-metallic materials and finishes that are not within a hermetically sealed enclosure, of the components specified herein shall meet the outgassing requirements as outlined in ESA PSS-01-702.

Specific requirements for materials and finishes are specified in the Detail Specification.

5. PRODUCTION CONTROL

5.1 GENERAL

The minimum requirements for production control, which are equally applicable to procurement, are defined in ESA/SCC Basic Specification No. 20100, Para's 5.1 and 5.2.

5.2 SPECIAL IN-PROCESS CONTROLS

5.2.1 Microsection Examination

A microsection examination shall be carried out in accordance with ESA/SCC Basic Specification No. 23400.

5.2.2 Steady State Humidity (85/85) Test

(a) **Applicability**

This test is not applicable to capacitors rated at greater than 500V. The test shall be performed on 12 chips from the highest capacitance value of each chip size from every fired ceramic lot that forms part of the qualification test lot or purchase order.

(b) **Initial Measurements**

The capacitors shall meet the requirements of Table 2 of the Detail Specification.

(c) **Mounting**

The capacitors shall be mounted as specified in Para. 9.15.

(d) **Procedure**

The capacitors shall be subjected to 85°C, 85% relative humidity for 240 hours minimum with 1.5Vdc (maximum) continuously applied across a series combination of the capacitor and a 100kΩ resistor.

(e) **Recovery**

The capacitors shall be dried and stabilised at room temperature for 3 to 4 hours.

(f) **Final Measurements**

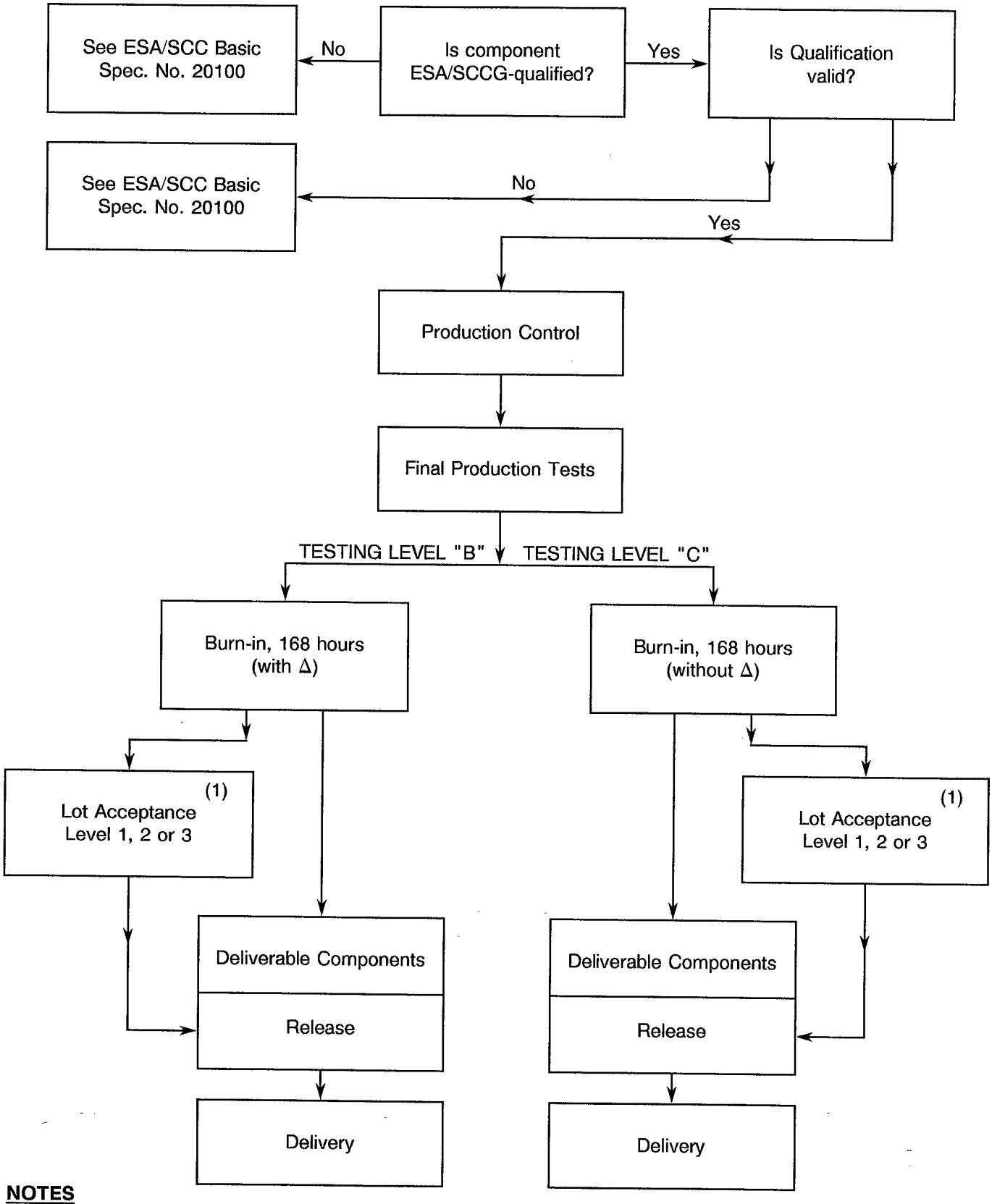
The capacitance, tangent of loss angle and insulation resistance at 1.5V, shall be measured and shall meet the requirements of Table 2 of the Detail Specification.

In the event of a single failure the lot shall be rejected.

5.2.3 Documentation

Documentation of special in-process controls shall be in accordance with the requirements of Para. 10.5 of this specification.

CHART I - TESTING LEVELS



NOTES

1. When applicable.

6. FINAL PRODUCTION TESTS

6.1 GENERAL

Unless otherwise specified in the Detail Specification, all components used for qualification testing and all components for delivery, including those submitted to lot acceptance tests, shall be subjected to tests and inspections in accordance with Chart II.

Unless otherwise specified in the Detail Specification, the tests shall be performed in the order shown.

Any components that do not meet these requirements shall be removed from the lot and at no future time be re-submitted to the requirements of this specification.

6.2 TEST METHODS AND CONDITIONS

The applicable test methods and conditions are specified in the paragraphs referenced in Chart II of this specification.

6.3 DOCUMENTATION

Documentation of final production test data shall be in accordance with the requirements of Para. 10.6 of this specification.

7. BURN-IN AND ELECTRICAL MEASUREMENTS

7.1 GENERAL

Unless otherwise specified in the Detail Specification, all components used for qualification testing and all components for delivery, including those submitted to lot acceptance tests, shall be subjected to tests and inspections in accordance with Chart III.

Unless otherwise specified in the Detail Specification, the tests shall be performed in the order shown.

The applicable test methods and conditions are specified in the paragraphs referenced in Chart III.

Components of testing level "B" shall be serialised or defined by jig position prior to the tests and inspections.

7.1.1 Conditions of Test

The conditions for burn-in shall be as shown in Table 5 of the Detail Specification.

Unless otherwise specified in the Detail Specification, components of both Levels "B" and "C" shall be subjected to a total burn-in period of 168 hours. For the applicable test methods and procedures, see Para. 9.13.

7.1.2 Data Points

For components of testing level "B", undergoing a total burn-in period of 168 hours, the data points for parameter drift measurement shall be 0 hours (initial) and 168 (+24 -0) hours (final).

For components of testing level "C", undergoing a total burn-in period of 168 hours, the data point for post-burn-in electrical measurements shall be 168 (+24 -0) hours.

7.2 FAILURE CRITERIA

7.2.1 Parameter Drift Failure

The acceptable delta limits are shown in Table 4 of the Detail Specification. A component of testing level "B" shall be counted as a parameter drift failure if the changes during burn-in are larger than the delta (Δ) values specified.

7.2.2 Parameter Limit Failure

A component shall be counted as a limit failure if one or more parameters exceed the limits shown in Tables 2 or 3 of the Detail Specification.

Any component which exhibits a limit failure prior to the burn-in sequence shall be rejected and not counted when determining lot rejection.

7.2.3 Other Failures

A component shall be counted as a failure in any of the following cases:

- Mechanical failure.
- Handling failure.
- Lost component.

7.3 FAILED COMPONENTS

A component shall be considered as a failed component if it exhibits one or more of the failure modes described in Para. 7.2 of this specification.

7.4 LOT FAILURE

In case of lot failure, the Manufacturer shall act in accordance with the requirements of Para. 4.3.1 of this specification.

7.4.1 Lot Failure during 100% Testing

If the number of components failed on the basis of the failure criteria described in Para. 7.2 exceeds 5% (rounded upwards to the nearest whole number) of the number of components submitted to burn-in and electrical measurements, the lot shall be considered as failed.

7.4.2 Lot Failure during Sample Testing

A lot shall be considered as failed if the number of allowable failures during sample testing, in accordance with General Inspection Level II of IEC Publication No. 410 and the applicable AQL, as specified in the Detail Specification, is exceeded.

If a lot failure occurs, a 100% testing may be performed with the lot failure criteria given in Para. 7.4.1.

7.5 DOCUMENTATION

Data documentation of burn-in and electrical measurements shall be in accordance with Para. 10.7 of this specification.

8. QUALIFICATION APPROVAL AND LOT ACCEPTANCE TESTS

8.1 QUALIFICATION TESTING

8.1.1 General

Qualification testing shall be in accordance with the requirements of Chart IV of this specification. The tests to Chart IV shall be performed on the specified sample, chosen at random from components which have successfully passed the tests in Charts II and III for testing level "B". This sample constitutes the qualification test lot.

The qualification test lot is divided into subgroups of tests and all components assigned to a subgroup shall be subjected to all of the tests in that subgroup, in the sequence shown.

The applicable test requirements are detailed in the paragraphs referenced in Chart IV.

The conditions governing qualification testing are given in ESA/SCC Basic Specification No. 20100, Para. 5.3 and, for the extension or renewal of qualification approval, in Para's 6.3 and 6.4.

8.1.2 Distribution within the Qualification Test Lot

A minimum sample of 120 components shall be submitted to qualification testing (Chart IV). The sample shall consist of test vehicles having the lowest and highest voltages and, for these voltages, the smallest and largest size. If there are more than 4 sizes, an intermediate size shall also be tested. Of each of these size/voltage combinations, the highest capacitance value and, for that value, the tightest tolerance shall be chosen.

Thus, for the qualification approval of a series, testing is required of either 2, 3, 4 or more test vehicles.

Where a series comprises more than 4 test vehicles, the minimum quantity of components per test vehicle must be:-

Subgroup 1 - 3 components.
Subgroup 2 - 6 components.
Subgroup 3 - 5 components.
Subgroup 4 - 10 components.
Subgroup 5 - 3 components.
Subgroup 6 - 3 components.

Where a series comprises less than 4 test vehicles, the sample shall be evenly distributed between the test vehicles.

The selected distribution shall be agreed with the Qualifying Space Agency.

8.2 LOT ACCEPTANCE TESTING

8.2.1 General

The sample sizes of the 3 lot acceptance levels are specified in Chart V. All components assigned to a subgroup shall be subjected to all of the tests of that subgroup in the sequence shown.

The tests to Chart V shall be performed on the specified sample which shall have been chosen, whenever possible, at random from the proposed delivery lot (but see Para. 8.2.3(b)). The applicable test requirements are detailed in the paragraphs referenced in Chart V.

As a minimum for procurement of non-qualified components, lot acceptance level 3 tests shall apply. For procurement of qualified components, lot acceptance testing shall be performed if specified in a purchase order. Procurement lots ordered with a lot acceptance test level shall be delivered only after successful completion of lot acceptance testing.

8.2.2 Distribution within the Sample for Lot Acceptance Testing

Where a Detail Specification covers a range or series of components that are considered similar, then it may be necessary that the sample for lot acceptance testing be comprised of component types so selected that they adequately represent all of the various mechanical, structural and electrical peculiarities of the procured range or series.

The distribution of the component types will normally vary from procurement to procurement and shall be as specified by the Orderer, following as closely as possible the requirements prescribed in Para. 8.1.2. of this specification.

8.2.3 Lot Acceptance Level 3 Testing (LA3)

Lot acceptance level 3 tests are designated as the electrical subgroup and comprise electrical measurements of characteristics and tests to prove the assembly capability of the component. For LA3 testing, the following requirements and conditions shall apply:-

(a) LA3 testing shall be performed by the Manufacturer's quality assurance personnel using dedicated quality assurance equipment whenever possible. LA3 testing shall not be a repetition of routine measurements made by production personnel during final production tests and burn-in and electrical measurements.

(b) When tests to Tables 2 and 3 of the Detail Specification have been performed on a sample basis, then the components for LA3 testing shall be selected from this sample.

(c) If the tests can be performed without mounting the components, the electrical measurements for LA3 are considered to be non-destructive and therefore components so tested may form part of the delivery lot.

(d) The solderability test is considered to be destructive and therefore components so tested may not form part of the delivery lot. Post-burn-in electrical rejects may be used for this test.

(e) When required in the purchase order, the Manufacturer shall notify the Orderer at least 2 working weeks before the commencement of LA3 testing. The Orderer shall indicate immediately whether or not he intends to witness the tests.

8.2.4 Lot Acceptance Level 2 Testing (LA2)

Lot acceptance level 2 testing shall comprise the tests for LA3 (electrical subgroup) plus tests on an endurance subgroup. For the electrical subgroup, the requirements and conditions as for LA3 (see Para. 8.2.3) shall apply.

For the endurance subgroup, the following shall apply:-

(a) Components of testing level "C", selected for the endurance subgroup, shall be serialised prior to the tests.

(b) The tests in this subgroup are considered to be destructive and therefore components (of testing level "B" or "C") so tested shall not form part of the delivery lot.

8.2.5 Lot Acceptance Level 1 Testing (LA1)

Lot acceptance level 1 testing shall comprise the tests for LA3 (electrical subgroup) and LA2 (endurance subgroup) plus tests on an environmental and mechanical subgroup. For the electrical and endurance subgroups, the requirements and conditions for LA3 (see Para. 8.2.3) and LA2 (see Para. 8.2.4) respectively shall apply.

For the environmental subgroup, the following shall apply:-

(a) Components of testing level "C", selected for the environmental subgroup, shall be serialised prior to the tests.

(b) The tests in this subgroup are considered to be destructive and therefore components (of testing level "B" or "C") so tested shall not form part of the delivery lot.

8.3 FAILURE CRITERIA

The following criteria shall apply to qualification testing and to lot acceptance testing.

8.3.1 Environmental and Mechanical Test Failures

The following shall be counted as component failures:

- Components which fail during tests for which the pass/fail criteria are inherent in the test method, e.g. solderability, adhesion, etc.

8.3.2 Electrical Failures

The following shall be counted as component failures:-

(a) Components which, when subjected to electrical measurements on completion of environmental tests, in accordance with either Table 2 or Table 6, as specified in the Detail Specification, fail one or more of the applicable limits.

(b) Components which, when subjected to electrical measurements at intermediate and end-points during endurance testing, in accordance with Table 6 of the Detail Specification, fail one or more of the applicable limits.

(c) Components which, when subjected to measurement of electrical characteristics, in accordance with Tables 2 and 3 of the Detail Specification, fail one or more of the applicable limits.

8.3.3 Other Failures

The following additional failures may also occur during qualification testing or lot acceptance testing:-

(a) Components failing to comply with the requirements of ESA/SCC Basic Specification No. 20500.

(b) Lost components.

8.4 FAILED COMPONENTS

A component shall be considered as failed if it exhibits one or more of the failure modes detailed in Para. 8.3 of this specification. The allowable number of failed components per Subgroup, the aggregate failure constraints and the permitted distribution of such failures are shown at the foot of Charts IV and V of this specification.

When requested by the Qualifying Space Agency or the Orderer, failure analysis of failed components shall be performed by the Manufacturer and the results provided.

Failed components from successful lots shall be marked as such and be stored at the Manufacturer's plant for 24 months.

8.5 LOT FAILURE

A lot shall be considered as failed if the allowable number of failures according to Chart IV or V of this specification, as relevant, has been exceeded.

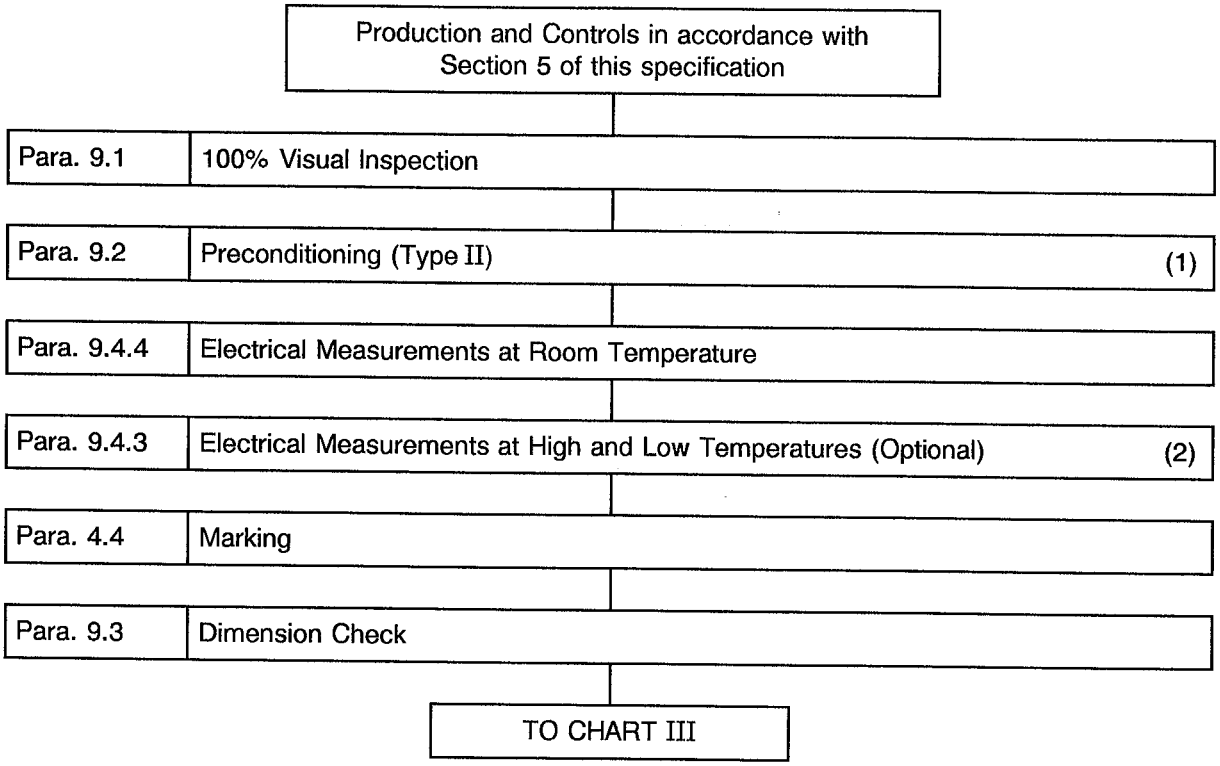
In the case of lot failure, the Manufacturer shall act in accordance with Para. 4.3.1 of this specification.

8.6 DOCUMENTATION

For qualification testing, the qualification test data shall be documented in accordance with the requirements of Para. 10.8 of this specification.

In the case of lot acceptance testing, the data shall be documented in accordance with the requirements of Para. 10.9 of this specification.

CHART II - FINAL PRODUCTION TESTS



NOTES

1. If specified in the Detail Specification.
2. The performance of these tests is left to the Manufacturer's discretion.

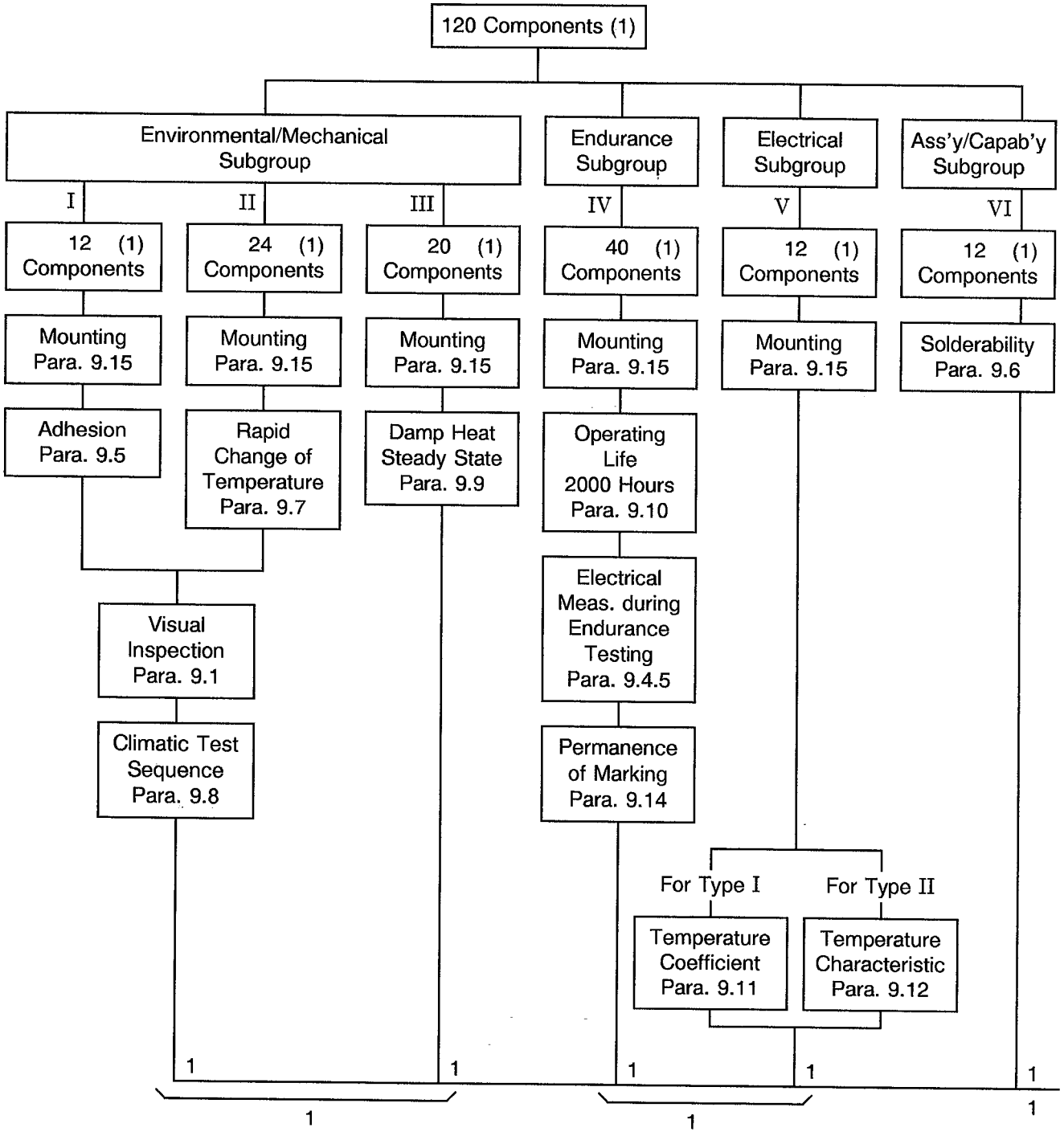
CHART III - BURN-IN AND ELECTRICAL MEASUREMENTS

		Testing Levels	
		B	C
	Components from Final Production Tests		
	Serialise or define jig positions	X	-
Para. 9.4.2	Parameter Drift Value, Initial Measurements	X	-
Para. 7.1.1 Para. 9.13	Burn-in, 168 hours	X	X
Para. 9.4.2	Parameter Drift Value, Final Measurements	X	-
Para. 9.4.3	Electrical Measurements at High and Low Temperatures	X	X
Para. 9.4.4	Electrical Measurements at Room Temperature (1)	X	X
Para. 9.1	Visual Inspection	X	X
Para. 7.4	Check for Lot Failure	X	X
	TO CHART IV OR V		

NOTES

1. The measurement of parameters for the purpose of drift value measurements need not be repeated for electrical measurements at room temperature.

CHART IV - QUALIFICATION TESTS

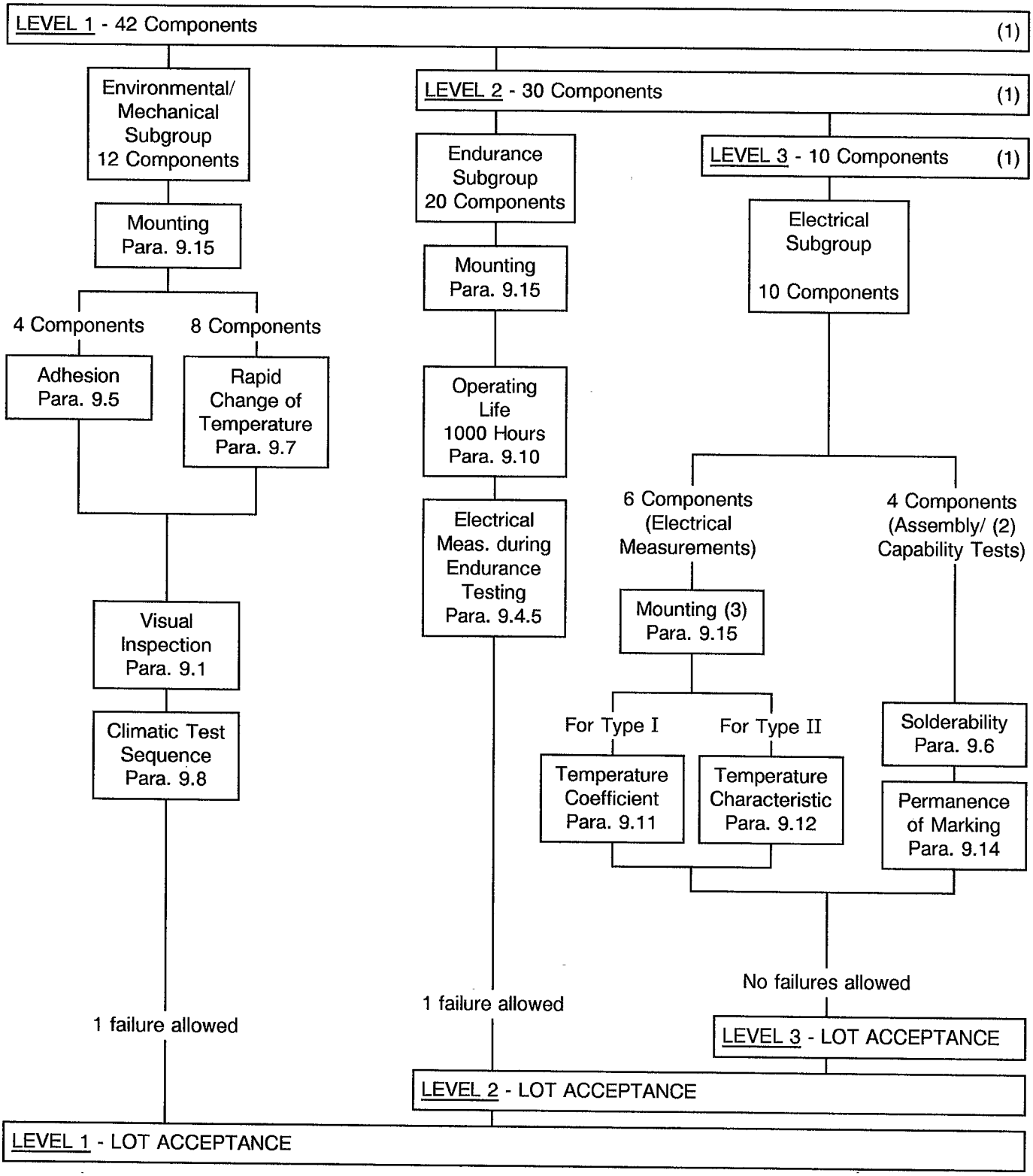


Total allowable number of failed components: 3.

NOTES

1. For distribution within the subgroups, see Para. 8.1.2.

CHART V - LOT ACCEPTANCE TESTS



NOTES

1. For distribution within the subgroups, see Para. 8.2.2.
2. Post burn-in electrical rejects may be used for these tests.
3. This operation is at the discretion of the Manufacturer, see Para. 8.2.3(c). If mounted, the components are not deliverable.

9. TEST METHODS AND PROCEDURES

If a Manufacturer elects to eliminate or modify a test method or procedure, the Manufacturer is still responsible for delivering components that meet all of the performance, quality and reliability requirements defined in this specification and the Detail Specification.

Documentation supporting the change shall be approved by the Qualifying Space Agency and retained by the Manufacturer. It shall be copied, when requested, to the Qualifying Space Agency.

The change shall be specified in the Detail Specification and in the P.I.D.

9.1 VISUAL INSPECTION

In accordance with ESA/SCC Basic Specification No. 20400.

9.2 PRECONDITIONING (TYPE II CAPACITORS ONLY)

When specified in the Detail Specification, preconditioning shall be performed under the following conditions:-

Exposure to maximum category temperature, or such higher temperature as is specified in the Detail Specification, for 1 hour, followed by recovery for 24 hours under standard atmospheric conditions.

9.3 DIMENSION CHECK

In accordance with ESA/SCC Basic Specification No. 20500 and the Detail Specification. To be performed on 5 samples per size only.

If one failure occurs, the complete lot shall be checked.

9.4 ELECTRICAL MEASUREMENTS

9.4.1 General

Electrical measurements and methods shall be as follows:-

9.4.1.1 Capacitance

Unless otherwise specified in the Detail Specification, the measurement frequency or frequencies and the applicable capacitance values or voltage ratings shall be:-

(a) **For Type I:**

Measuring voltage : $V_M \leq 5.0$ Vrms.
Frequency : For $C \leq 1000$pF, $f_M = 1.0$MHz $\pm 20\%$.
For $C > 1000$pF, $f_M = 1.0$kHz $\pm 20\%$.

(b) **For Type II:**

Measuring voltage : $V_M \leq 1.0$ Vrms.
Frequency : For $C \leq 100$pF, $f_M = 1.0$MHz $\pm 20\%$.
For $C > 100$pF, $f_M = 1.0$kHz $\pm 20\%$.

The accuracy of the measuring equipment shall be such that the error does not exceed:

- For absolute capacitance measurements: 10% of the rated capacitance tolerance.
- For measurement of variation in capacitance: 10% of the specified maximum change in capacitance.

Temperature variations due to handling shall be avoided.

9.4.1.2 Tangent of Loss Angle

The tangent of loss angle shall be measured under the same conditions as those specified for the measurement of capacitance and at one or more frequencies as specified in Para. 9.4.1.1.

The measuring instruments shall have an accuracy of the order of 1.10^{-4}.

9.4.1.3 Insulation Resistance

Before this measurement is made, the capacitors shall be fully discharged. Unless otherwise specified in the Detail Specification, the insulation resistance shall be measured with the voltage specified below and between the appropriate "Measuring Points" specified herein.

RATED VOLTAGE OF CAPACITOR U_R (V)	MEASURING VOLTAGE V_T (V)
$U_R \leq 10$	$U_R \pm 10\%$
$10 < U_R \leq 100$	10 ± 1.0V (Note 1)
$100 < U_R < 500$	100 ± 15V
$U_R \geq 500$	500 ± 50V

NOTES

1. When it can be demonstrated that the voltage has no influence on the measuring result, or that a known relationship exists, measurement can be performed at voltages up to the rated voltage (10V shall be used in case of dispute).

U_R is the rated voltage for use in defining the measuring voltage to be used under standard atmospheric conditions for testing. Unless otherwise specified in the Detail Specification, the insulation resistance shall be measured after the voltage has been applied for 1 minute $\pm$ 5 seconds.

The internal resistance of the voltage source R_S shall be such that $R_S C_R \leq 1$ second (where C_R = rated capacitance of the capacitor under test). The charging current shall not exceed 0.05A.

MEASURING POINTS

Test	1 Single section capacitors	2 Multiple section capacitors having a common termination for all sections	3 Multiple section capacitors having no common termination
A Between terminations	1a Between terminations	2a Between each of the terminations and the common termination	3a Between terminations of each section

9.4.1.4 Voltage Proof

9.4.1.4.1 Measurement

The test specified below is a d.c. voltage proof test. When the Detail Specification specified an a.c. voltage proof test, the same test procedure shall be used, except that an alternating voltage shall be applied in place of a direct voltage.

The test voltage shall be applied between the terminations and the level of the test voltage shall be as follows.

RATED VOLTAGE OF CAPACITOR U_R (V)	TEST VOLTAGE V_T (V)
$U_R < 500$	2.5 U_R
$U_R = 500$	2.0 U_R
$500 < U_R \leq 1250$	1.5 U_R
$U_R > 1250$	1.3 U_R (1)

NOTES

1. It is recommended that the capacitors be immersed in an inert medium to prevent arcing or high leakage currents.

The voltage shall be applied for 1 minute between the measuring points.

The maximum value of time constant R_1 $(C_1 + C_X) \leq 1$ second (see test circuit diagram in Para. 9.4.1.4.2).

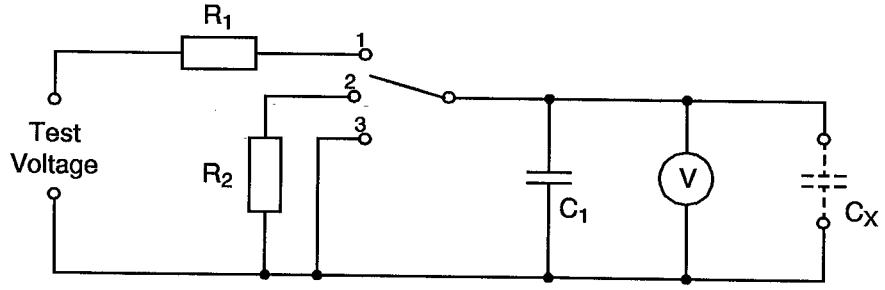
The charging current shall not exceed 0.05A.

There shall be no sign of breakdown or flash-over during the test period.

9.4.1.4.2 Test Circuit

An example of a suitable test circuit is shown.

FIGURE 1 - VOLTAGE PROOF TEST CIRCUIT



The resistance of the voltmeter shall be not less than 10 000Ω/V.

The resistances R_1 and R_2 shall be chosen such that, in conjunction with the capacitance C_1 and the capacitance of the part under test, the charging and discharging currents do not exceed the specified value at the highest test voltage. The capacitance of C_1 shall be at least ten times the capacitance of C_X.

The switch shall be connected to R_2.

A variable d.c. test voltage of sufficient level shall be connected to the circuit and adjusted to the required level. The internal resistance of the voltage supply shall be negligible compared with R_1. The capacitor to be tested (C_X) shall be connected as indicated in the diagram.

The switch shall then be connected to R_1 so that the capacitors C_1 and C_X are charged.

The switch shall remain in this position for the time specified after the test voltage has been reached. The capacitor shall be discharged by connecting the switch to R_2. As soon as the voltmeter reading has fallen to zero, the capacitors shall be short-circuited and C_X shall be disconnected.

9.4.2 Parameter Drift Value Measurements

At each of the relevant data points for components of testing level 'B', measurements shall be made of all parameters listed in Table 4 of the Detail Specification. All values obtained shall be recorded against serial numbers or jig positions and the parameter drift calculated.

9.4.3 Electrical Measurements at High and Low Temperatures

For components of testing levels "B" and "C", the electrical measurements at high and low temperatures shall be made in accordance with Table 3 of the Detail Specification. Where sample testing is applied, note the requirements of Para. 8.2.3(b). For testing level "B", all values obtained shall be recorded against serial numbers or jig positions.

9.4.4 Electrical Measurements at Room Temperature

For components of testing levels "B" and "C", the measurements of electrical characteristics shall be made in accordance with Table 2 of the Detail Specification, except that the Voltage Proof Test may be omitted on deliverable items during Final Production Tests (Chart II) and carried out only once after Burn-in as required by Chart III. Where sample testing is applied, note the requirements of Para. 8.2.3(b). For testing level "B", all values obtained shall be recorded against serial numbers or jig positions, except during Final Production Tests (Chart II).

9.4.5 Electrical Measurements during Endurance Testing

At each of the relevant data points specified for endurance testing, measurements shall be made of all parameters listed in Table 6 of the Detail Specification. All values obtained shall be recorded against serial numbers or jig positions and the parameter drift calculated, if required.

9.5 ADHESION

9.5.1 Procedure

A force of 5.0N shall be applied normal to the line joining the terminations and in a plane parallel to the substrate. The force shall be applied progressively (without any shock) and then maintained for a period of 10 ± 1.0 seconds.

9.5.2 Final Examination

There shall be no evidence of damage or loosening of the component from the substrate. The capacitance shall be measured as specified in Para. 9.4.1.1.

9.6 SOLDERABILITY

9.6.1 Procedure

The capacitors shall be subjected to Test 'Ta', Method 1 of IEC Publication No. 68-2-20. The capacitors shall be completely immersed for 4.0 ± 1.0 seconds.

9.6.2 Final Examination

When the test procedures have been carried out, the capacitors shall be visually examined. At least 75% of the terminations shall be covered by a smooth solder coating. The remaining 25% may contain small pin-holes or rough spots, but these shall not be concentrated in one area. There shall be no evidence of damage.

9.7 RAPID CHANGE OF TEMPERATURE

9.7.1 Procedure for Final Production Tests (Chart II)

The capacitors shall be submitted to Test 'Na' of IEC Publication No. 68-2-14 for 10 cycles. The following details shall apply:-

T_A = Minimum operating temperature as defined in Table 1(b) of the Detail Specification.

T_B = Maximum operating temperature as defined in Table 1(b) of the Detail Specification.

t_1 = 30 minutes.

t_2 = 1.0 minute.

9.7.2 Procedure for Qualification Tests (Chart IV) and Lot Acceptance Tests (Chart V)

For initial measurements, the capacitance value recorded during Para. 9.15, Mounting shall be used.

The capacitors shall be submitted to Test 'Na' of IEC Publication No. 68-2-14 for 10 cycles. The following details shall apply:-

T_A = Minimum storage temperature as defined in Table 1(b) of the Detail Specification.

T_B = Maximum storage temperature as defined in Table 1(b) of the Detail Specification.

t_1 = 30 minutes.

t_2 = 1.0 minute.

After a recovery period of 24 ± 2 hours at standard atmospheric conditions, the capacitors shall be visually examined and there shall be no evidence of damage. The capacitance change and tangent of loss angle shall be measured and shall be within the limits specified in Table 6 of the Detail Specification.

9.8 CLIMATIC TEST SEQUENCE

9.8.1 Initial Measurements

The capacitance value recorded during Para. 9.15, Mounting shall be used.

9.8.2 Dry Heat

The capacitors shall be subjected to Test 'Ba' of IEC Publication No. 68-2-2. Duration: 2 hours. Maximum storage temperature as specified in the Detail Specification (Table 1(b)).

9.8.3 Damp Heat, Accelerated, First Cycle

Unless otherwise specified in the Detail Specification, the capacitors shall be subjected to Test 'Db', Severity b, Variant 2 of IEC Publication No. 68-2-30 for 1 cycle. After recovery, the capacitors shall be subjected immediately to the cold test.

9.8.4 Cold Test

The capacitors shall be subjected to Test 'Aa' of IEC Publication No. 68-2-1. Duration: 2 hours. Minimum storage temperature as specified in the Detail Specification (Table 1(b)).

9.8.5 Damp Heat, Accelerated, Remaining Cycles

Test 'Db', Severity b, Variant 2 of IEC Publication No. 68-2-30 for 5 cycles.

9.8.6 Final Measurements

After a recovery period of 1 to 24 hours, the capacitors shall be visually inspected according to ESA/SCC Basic Specification No. 20500. The capacitance change, tangent of loss angle and insulation resistance shall be measured and shall meet the requirements of Table 6 of the Detail Specification.

9.9 DAMP HEAT, STEADY STATE

9.9.1 Initial Measurements

The capacitance value recorded during Para. 9.15, Mounting shall be used.

9.9.2 Procedure

The capacitors shall be subjected to Test 'Ca' of IEC Publication No. 68-2-3 for 56 days with no voltage applied unless otherwise specified in the Detail Specification.

9.9.3 Recovery and Final Measurements

After a recovery period of 6 to 24 ± 2 hours, the capacitors shall be visually examined and there shall be no evidence of damage. The capacitance change, tangent of loss angle and insulation resistance shall meet the requirements of Table 6 of the Detail Specification.

9.10 OPERATING LIFE

9.10.1 Initial Measurements

The capacitance value recorded during Para. 9.15, Mounting shall be used.

9.10.2 Procedure

The capacitors shall be submitted to an endurance test of 2000 hours or 1000 hours respectively, as required by Chart IV or V, at upper category temperature. The applied voltage shall be as follows.

RATED VOLTAGE OF CAPACITOR U_R (V)	APPLIED VOLTAGE V_T (V)
$U_R < 500$	$2.0U_R$
$U_R = 500$	$1.5U_R$
$500 < U_R \leq 1250$	$1.3U_R$
$U_R > 1250$	$1.0U_R$ (1)

NOTES

1. It is recommended that the capacitors be immersed in an inert medium to prevent arcing or high leakage currents. Alternatively, the capacitors may be leaded and encapsulated prior to performance of the test.

9.10.3 Intermediate Measurements

After 1000 hours for Qualification testing, the capacitance change and insulation resistance shall be measured (the recovery period shall be 1 hour minimum for Type I and 24 ± 2 hours for Type II under standard atmospheric conditions) and shall meet the requirements of Table 6 of the Detail Specification.

9.10.4 Final Measurements

After 2000 hours for Qualification testing and 1000 hours for Lot Acceptance testing, the capacitance change, tangent of loss angle, insulation resistance and voltage proof shall be measured (the recovery period shall be 24 ± 2 hours under standard atmospheric conditions) and shall meet the requirements of Table 6 of the Detail Specification. The capacitors shall be visually examined and there shall be no evidence of damage.

9.11 TEMPERATURE COEFFICIENT (TYPE I)

The capacitors shall be maintained at each of the following temperatures in turn:-

(a) +20 ± 2 °C.

(b) Minimum storage temperature specified in Table 1(b) of the Detail Specification ±2°C.

(c) +20 ± 2 °C

(d) Maximum storage temperature specified in Table 1(b) of the Detail Specification ±2°C.

After the capacitors have reached thermal stability, the capacitance measurements shall be made at each of the temperatures specified above. The temperature of the chamber at the time of each capacitance measurement shall be recorded. The time for stabilisation at each successive temperature step shall be such that two readings of capacitance, made at intervals of 5 minutes, shall not differ by an amount greater than that attributable to the measuring equipment. The measurement of temperature shall be accurate to within 0.5°C. The temperature coefficient shall be computed from the following formula:-

$$\text{Average temperature coefficient in parts per million per °C} = \frac{\Delta C}{C\Delta T} .10^6$$

where ΔC is the difference between the capacitance value at (c) and the capacitance value at (b) or (d) respectively. C is the capacitance value at (c). ΔT is the difference in °C between the test temperature and the temperatures at (b) and (d) respectively.

The limit values specified in Table 6 of the Detail Specification shall not be exceeded.

9.12 TEMPERATURE CHARACTERISTIC (TYPE II)

If specified in the Detail Specification for Final Production Tests (Chart II) the capacitors shall be preconditioned (see Para. 9.2.2) and then subjected to the following sequence:-

(a) The capacitance shall be measured at +20 ± 2 °C.

(b) The capacitors shall be subjected to the minimum storage temperature ±2°C specified in Table 1(b) of the Detail Specification. The capacitance shall be measured at this temperature.

(c) The temperature shall then be raised slowly to +20 ± 2 °C and the capacitance measured at this temperature; this measurement shall be taken as the reference point.

(d) The temperature shall then be raised slowly to the maximum storage temperature ±2°C specified in Table 1(b) of the Detail Specification. The capacitance shall be measured at this temperature.

(e) A direct voltage equal to the rated voltage U_R or 500V, whichever is less, shall be applied to the capacitors subjected to the maximum temperature ±2°C. The capacitance shall be measured at this temperature.

(f) The temperature shall then be lowered slowly to +20 ±2 °C and the capacitance measured at this temperature with the rated voltage U_R or 500V, whichever is less, applied to the capacitor.

(g) The temperature shall then be lowered slowly to the minimum temperature ±2°C and the capacitance measured at this temperature with the rated voltage U_R or 500V, whichever is less, applied to the capacitor.

(h) The temperature shall be returned slowly to +20 ±2 °C and the capacitance measured with no applied voltage.

In each of the above conditions, the capacitance shall be measured in accordance with Para. 9.4.1.1. The temperature characteristic shall be computed from the following formula:-

$$\text{Temperature characteristic in per cent} = \frac{\Delta C}{C} .100$$

where ΔC is the difference between the capacitance value at (c) and the capacitance value at (b), (d), (e) and (g) respectively and C is the capacitance value at (c).

The temperature characteristic shall be calculated for each value of ΔC above and shall not exceed the limit values specified in Table 6 of the Detail Specification.

9.13 BURN-IN

The test shall be conducted in accordance with IEC Publication 384-1, Clause 4.23.

9.14 PERMANENCE OF MARKING

In accordance with ESA/SCC Basic Specification No. 24800.

9.15 MOUNTING

9.15.1 Procedure

The capacitors shall be mounted on a suitable substrate in accordance with IEC Publication No. 384-1, Clause 4.33.

9.15.2 Final Examination

The terminals shall be examined for good tinning as evidenced by the flowing of the solder with wetting of the terminals.

9.15.3 Final Measurements

The capacitance, tangent of loss angle and insulation resistance shall be measured and shall be within the limits specified in Table 6 of the Detail Specification. The capacitance value measured shall be recorded.

10. DATA DOCUMENTATION

10.1 GENERAL

For the qualification approval records and with each component delivery, a data documentation package is required. Depending on the testing level and lot acceptance level specified for the component, this package shall be compiled from:-

(a) Cover sheet (or sheets).

(b) List of equipment (testing and measuring).

(c) List of test references.

(d) Special in-process control test data.

(e) Final production test data (Chart II) (but see Para. 10.6).

(f) Burn-in and electrical measurement data (Chart III).

(g) Qualification test data (Chart IV).

(h) Lot acceptance test data (Chart V) (when applicable).

(i) Failed component list (see Paras. 7.3 and 8.4) and failure analysis report (see Para. 8.4).

(j) Certificate of Conformity.

Items (a) to (j) inclusive shall be grouped, preferably as subpackages and, for identification purposes, each page shall include the following information:

- ESA/SCC Component Number.
- Manufacturer's name.
- Lot identification.
- Date of establishment of the document.
- Page number.

10.1.1 Qualification Approval

In the case of qualification approval, the items listed in Para. 10.1 (a) to (j) less item (h) are required.

10.1.2 Testing Level "B"

10.1.2.1 Qualified Components

For deliveries of qualified components, the following documentation shall be supplied:-

(a) Cover sheet (if all of the information is not included on the Certificate of Conformity).

(b) Certificate of Conformity (including range of delivered serial numbers).

(c) Attributes record of measurements, tests and inspections performed in Chart II, Chart III (including PDA figure) and Chart V (where applicable).

(d) Failed components list.

10.1.2.2 Unqualified Components

For deliveries of unqualified components, the documentation to be supplied shall be in accordance with Para. 10.1.2.1 plus the following:-

(a) Read and record data from Chart III.

(b) Special in-process control data (where applicable).

(c) Failure analysis report on failed components.

10.1.3 Testing Level "C"

10.1.3.1 Qualified Components

For deliveries of qualified components, the following documentation shall be supplied:-

(a) Certificate of Conformity.

10.1.3.2 Unqualified Components

For deliveries of unqualified components, the documentation to be supplied shall be in accordance with Para. 10.1.3.1 plus the following:-

(a) Cover sheet (if all of the information is not included on the Certificate of Conformity).

(b) Attributes record of all measurements, tests and inspections performed in Charts II, III and V (when applicable).

(c) Failed components list (including Failure Analysis Report).

(d) Special in-process control data (when applicable).

10.1.4 Data Retention/Data Access

If not delivered, all data shall be retained by the Manufacturer for a minimum of 5 years during which time it shall be available to the Qualifying Space Agency and the Orderer, if requested, for review. The Manufacturer shall deliver variables Data/Reports to the Orderer if required by the Purchase Order.

10.2 COVER SHEET(S)

The cover sheet(s) of the data documentation package shall include as a minimum:-

(a) Reference to the Detail Specification, including issue and date.

(b) Reference to the applicable ESA/SCC Generic Specification, including issue and date.

(c) Component type and number.

(d) Lot identification.

(e) Range of delivered serial numbers (for components of testing level "B").

(f) Number of purchase order.

(g) Information relative to any additions to this specification and/or the Detail Specification.

(h) Manufacturer's name and address.

(j) Location of the manufacturing plant.

(k) Signature on behalf of Manufacturer.

(l) Total number of pages of the data package.

10.3 LIST OF EQUIPMENT USED

A list of equipment used for tests and measurements shall be prepared, if not in accordance with the data given in the Process Identification Document (P.I.D.). Where applicable, this list shall contain inventory number, Manufacturer's type number, serial number, etc. This list shall indicate for which tests such equipment was used.

10.4 LIST OF TEST REFERENCES

This list shall include all Manufacturer's references or codes which are necessary to correlate the test data provided with the applicable tests specified in the tables of the Detail Specification.

10.5 SPECIAL IN-PROCESS CONTROL DATA

Data of microsection examination shall be provided in accordance with the requirements of ESA/SCC Basic Specification No. 23400.

10.6 FINAL PRODUCTION TEST DATA (CHART II)

A test result summary shall be compiled showing the total number of components submitted to, and the total number rejected after, each of the following tests:

- Visual inspection (Para. 9.1).
- Electrical measurements at room temperature (Para. 9.4.4).
- Electrical measurements at high and low temperatures (Para. 9.4.3) (when applicable).
- Dimension check (Para. 9.3).

The final production test data shall form an integral part of the data documentation package, but it is not a mandatory requirement that it be delivered with the qualification lot or delivery lot. However, the data package to be delivered shall contain the information as detailed in Paras. 10.1.2 and 10.1.3 or at least shall contain a list of final production tests actually performed and a certification that the data is available for review.

10.7 BURN-IN AND ELECTRICAL MEASUREMENT DATA (CHART III)

10.7.1 Testing Level "B"

For components of testing level "B", all data shall refer to the relevant serial numbers or jig positions. Against these serial numbers or jig positions, data shall be recorded of the following:-

(a) 0-hour measurement for burn-in.

(b) 168-hour measurement for burn-in.

(c) Delta values after burn-in.

(d) Values obtained during measurements at high and low temperatures (Table 3 of the Detail Specification).

(e) Values obtained during measurements of electrical characteristics (Table 2 of the Detail Specification).

(f) Failures during visual inspection.

10.7.2 Testing Level "C"

For components of testing level "C", a test result summary (i.e. the total number of components subjected to, and the total number rejected from, each of the tests and inspections) shall be prepared.

10.8 QUALIFICATION TEST DATA (CHART IV)

All data shall be referenced to the relevant serial numbers or jig positions. Detailed records shall be provided of the components submitted to each test in each of the subgroups and of those rejected. Detailed data shall be provided of all electrical measurements made in accordance with Table 6 of the Detail Specification, as and where applicable.

10.9 LOT ACCEPTANCE TEST DATA (CHART V)

10.9.1 Testing Level "B"

All data shall be referenced to the relevant serial numbers or jig positions. Detailed records shall be provided of the components submitted to each test in each of the subgroups (as relevant to the lot acceptance level) and of those rejected.

Detailed data shall be provided of all electrical measurements made in accordance with Table 6 of the Detail Specification, as and where applicable.

10.9.2 Testing Level "C"

A test result summary (i.e. the total number of components submitted to, and and the total number rejected from, each of the tests and inspections) as relevant to the lot acceptance level shall be provided.

In the case of lot acceptance 2 testing, all data in respect of electrical measurements made in accordance with Table 6 of the Detail Specification shall be referenced to the relevant serial numbers (see Para. 8.2.4(a)).

In the case of lot acceptance 1 testing, all data in respect of electrical measurements made in accordance with Table 6 of the Detail Specification shall be referenced to the relevant serial numbers (see Para. 8.2.5(a)).

10.10 FAILED COMPONENTS LIST AND FAILURE ANALYSIS REPORT

The failed component list and failure analysis report shall provide full details of:-

(a) The reference number and description of the test or measurement performed as defined in this specification and/or the Detail Specification.

(b) The serial number or jig position (if applicable) of the failed component.

(c) The failed parameter and the failure mode of the component.

(d) Detailed failure analysis, if requested.

10.11 CERTIFICATE OF CONFORMITY

A Certificate of Conformity shall be established as defined in ESA/SCC Basic Specification No. 20100.

11. DELIVERY

For qualification approval, the disposition of the qualification test lot and its related documentation shall be as specified in ESA/SCC Basic Specification No. 20100 and the relevant paragraphs of Section 10 of this specification.

For procurement, for each order, the items forming the delivery are:-

(a) The delivery lot.

(b) The components used for lot acceptance testing, (when applicable), but not forming part of the delivery lot (see Para's 8.2.3(d), 8.2.4(b) and 8.2.5(b)).

(c) The relevant documentation in accordance with the requirements of Section 10 of this specification.

In the case of a component for which a valid qualification approval is in force, all data of all components submitted to LA1 and LA2 testing shall also be copied, when requested, to the relevant Qualifying Space Agency.

12. PACKAGING AND DESPATCH

The packaging and despatch of components to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 20600.