CONNECTORS, ELECTRICAL, FILTERED, RECTANGULAR, NON-REMOVABLE CONTACTS

ESCC Generic Specification No. 3405

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DOCUMENTATION CHANGE NOTICE

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DCR No.	CHANGE DESCRIPTION
1257, 1380	Specification upissued to incorporate changes per DCR.

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1 INTRODUCTION

1.1 SCOPE

This specification defines the general requirements for the qualification, qualification maintenance, procurement, and delivery of filtered rectangular electrical connectors with non-removable contacts 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 components qualified in accordance with one of the following ESCC methods:

- Qualification of Standard Components per ESCC Basic Specification No. 20100.
- Technology Flow Qualification per ESCC Basic Specification No. 25400.

It is also primarily applicable to the procurement of components so qualified.

This specification may also be applied to the procurement of unqualified components, recommendations for which are given in ESCC Basic Specification No. 23100.

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 starting qualification or placing the Purchase Order.

2.1 ESCC 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 ESCC Components.
- No. 21300, Terms, Definitions, Abbreviations, Symbols and Units.
- No. 21700, General Requirements for the Marking of ESCC Components.
- No. 22600, Requirements for the Evaluation of Standard Electronic Components for Space Application.
- No. 22800, ESCC Non-Conformance Control System.
- No. 23100, Recommendations on the use of the ESCC Specification System for the Evaluation and Procurement of Unqualified Components.
- No. 23500, Requirements for Lead Materials and Finishes for Components for Space Application.
- No. 24400, Measurement of Insertion Loss for EMI Suppression Filters.
- No. 24600, Minimum Quality System Requirements.
- No. 24800, Resistance to Solvents of Marking, Materials and Finishes.
- No. 25400, Requirements for the Technology Flow Qualification of Electronic Components for Space Application.

For qualification and qualification maintenance or procurement of qualified components, with the exception of ESCC Basic Specifications Nos. 20100, 21700, 22800, 24600 and 25400, where Manufacturers' specifications are equivalent to, or more stringent than, the ESCC Basic Specifications listed above, they may be used in place of the latter, subject to the approval of the ESCC Executive.

Such replacements shall be clearly identified in the applicable Process Identification Document (PID).

For procurement of unqualified components, where Manufacturers' specifications are equivalent to or more stringent than the ESCC Basic Specifications listed above, they may be used in place of the latter subject to the approval of the Orderer.

Such replacements may be listed in an appendix to the appropriate Detail Specification at the request of the Manufacturer or Orderer, subject to the approval of the ESCC Executive.

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

2.2 OTHER (REFERENCE) DOCUMENTS

- ECSS-Q-ST-70-08, Manual soldering of high-reliability electrical connections.
- IEC Publication No. 60068 Part 2, Basic Environmental Testing Procedures.
- IEC Publication No. 60384 Part 1, Generic Specification for Fixed Capacitors for Use in Electronic Equipment.
- IEC Publication No. 60512, Electromechanical components for electronic equipment - Basic testing procedures and measuring methods.

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) ESCC Detail Specification.
(b) ESCC Generic Specification.
(c) ESCC Basic Specification.
(d) Other documents, if referenced herein.

3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

The terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply. In addition, the following terms and definitions apply:

- Filter Contact: a contact that contains one, or more, passive components (the filter element) designed to act as a filter.
- Non-filter Contact: a contact that does not contain a filter element.
- Lot Traceability: A single lot of connectors shall only contain a single lot of each contact type. A single lot of filter contacts shall only contain a single lot of filter elements. A single lot of filter elements shall only contain a single lot of each passive component type.

4 REQUIREMENTS

4.1 GENERAL

The requirements for the qualification of a component shall be in accordance with ESCC Basic Specification No. 20100.

The requirements for Technology Flow Qualification and the listing of qualified component types shall be in accordance with ESCC Basic Specification No. 25400.

The test requirements for procurement of both qualified and unqualified components (see Chart F1) shall comprise:

- Requirements for Contacts.
- Special In-Process Controls.
- Screening Tests.
- Periodic Testing (for qualified components only).
- Lot Validation Testing if stipulated in the Purchase Order.

4.1.1 Specifications

For qualification, qualification maintenance, procurement and delivery of components in conformity with this specification, the applicable 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 ESCC 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 ESCC Executive (for qualification, qualification maintenance, or procurement of qualified components) or the Orderer (for procurement of unqualified components), to use an approved external facility.

4.1.4 Inspection Rights

The ESCC Executive (for qualification, qualification maintenance, or procurement of qualified components) or the Orderer (for procurement of unqualified components if stipulated in the Purchase Order) reserves the right to monitor any of the tests and inspections scheduled in the applicable specifications.

4.2 QUALIFICATION AND QUALIFICATION MAINTENANCE REQUIREMENTS ON A MANUFACTURER

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

To obtain and maintain the qualification of a component produced using a qualified Technology Flow, a Manufacturer shall satisfy the requirements of ESCC Basic Specification No. 25400.

4.3 DELIVERABLE COMPONENTS

4.3.1 ESCC Qualified Components

Components delivered to this specification shall be processed and inspected in accordance with the relevant Process Identification Document (PID).

4.3.2 ESCC Components

Each component, irrespective of qualification status, identified with an ESCC component number and delivered to this specification shall:

- be traceable to its production lot.
- have satisfactorily completed all the tests required by the relevant issues of the applicable specifications.
- be produced from lots that are considered by the Manufacturer to be capable of passing all applicable tests, and sequences of tests, that are defined in Chart F4. 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, demonstrably, it could not have passed these tests at the time of manufacture, this shall be grounds for rejection of the delivered lot.

4.3.3 Lot Failure

Lot failure may occur during Requirements for Contacts (Chart F2), Screening Tests (Chart F3), or Qualification, Periodic Testing and Lot Validation Testing (Chart F4).

Should such failure occur during qualification, qualification maintenance or procurement of qualified components the Manufacturer shall initiate the non-conformance procedure in accordance with ESCC Basic Specification No. 22800. The Manufacturer shall notify the Orderer and the ESCC Executive by any appropriate written means, within 5 working days, giving details of the number and mode of failure and the suspected cause. No further testing or analysis shall be performed on the failed components until so instructed by the ESCC Executive.

Should such failure occur during procurement of unqualified components the Manufacturer shall notify the Orderer by any appropriate written means within 5 working days, giving details of the number and mode of failure and the suspected cause. No further testing or analysis shall be performed on the failed components until so instructed by the Orderer. The Orderer shall inform the Manufacturer within 5 working days of receipt of notification what action shall be taken.

4.4 MARKING

All components procured and delivered to this specification shall be marked in accordance with ESCC Basic Specification No. 21700.

4.5 MATERIALS AND FINISHES

Specific requirements for materials and finishes are specified in the Detail Specification. Where a definite material or finish is not specified a material or finish shall be used so as to ensure that the component meets the performance requirements of this specification and the Detail Specification. Acceptance or approval of any constituent material or finish does not guarantee acceptance of the finished product.

All materials and finishes of the components specified in the Detail Specification shall comply with the restrictions on materials specified in ESCC Basic Specification No. 22600.

5 PRODUCTION CONTROL

5.1 GENERAL

Unless otherwise specified herein or in the Detail Specification all lots of components used for qualification and qualification maintenance, Lot Validation Testing and for delivery shall be subject to tests and inspections in accordance with Chart F2 in the sequence shown.

Any components which do not meet these requirements shall be removed from the lot and at no future time be resubmitted to the requirements of this specification.

The applicable test requirements are detailed in the paragraphs referenced in Chart F2.

For qualified components the full production control provisions are defined in the PID.

In the case of lot failure, the Manufacturer shall act in accordance with Para. 4.3.3.

5.2 REQUIREMENTS FOR CONTACTS

For all contact types to be used within the components, each lot shall be subjected to the following tests.

5.2.1 Gold Plate Porosity

Gold Plate Porosity shall be performed in accordance with Para. 8.1 on a sample of 10 contacts selected from each contact lot. In the event of any failure, the lot shall be considered as failed.

5.2.2 Plating Thickness

Plating Thickness measurements shall be made in accordance with Para. 8.2 on a sample of 10 male contacts and 10 female contacts selected from each contact lot. In the event of any failure, the lot shall be considered as failed.

5.2.3 Contact Visual Inspection

Only applicable to filter contacts.

Each lot of filter elements, and contact bodies, shall be visually inspected before and after assembly in accordance with Para. 8.3.

5.2.4 Operating Life Test for Filter Contacts

Testing shall be performed in accordance with Para. 8.4 on a sample of 50 assembled filter contacts selected from each contact lot. Contact traceability shall be maintained during testing.

These filter contacts shall not subsequently be assembled into deliverable connectors.

In the event of any failure, the lot shall be considered as failed.

5.2.5 Contact Capability

Contact Capability shall be performed on all contacts of each contact lot in accordance with Para. 8.5.

The lot shall be considered as failed if more than 10% (rounded up to the nearest whole number) of the contacts fail Contact Capability.

5.2.6 Electrical Measurements (Contacts)
Only applicable to filter contacts.

Measurements shall be performed on all contacts of each contact lot as follows. Contact traceability shall be maintained during testing.

The lot shall be considered as failed if more than 10% (rounded up to the nearest whole number) of the contacts submitted to Burn-in fail Para. 5.2.6.2 Final Electrical Measurements.

5.2.6.1 Initial Electrical Measurements
Measurements shall be performed immediately prior to Burn-in as specified in Room Temperature Electrical Measurements in the Detail Specification. For electrical characteristics that are specified in Parameter Drift Values in the Detail specification, read and record values shall be taken.

5.2.6.2 Final Electrical Measurements
Measurements shall be performed immediately after Burn-in as specified in Room Temperature Electrical Measurements, High and Low Temperatures Electrical Measurements, and Parameter Drift Values, in the Detail Specification. Parameter drift from the initial measurements shall be calculated (on a go-no-go basis) as specified in Parameter Drift Values in the Detail Specification.

5.2.7 Burn-in (Contacts)
Only applicable to filter contacts.

Burn-in of each contact lot shall be performed in accordance with Para. 8.6. Contact traceability shall be maintained during testing.

5.2.8 External Visual Inspection (Contacts)
Each contact lot shall be inspected in accordance with Para. 8.7.

5.2.9 Documentation
Documentation of Requirements for Contacts shall be in accordance with Para. 9.5.

5.3 SPECIAL IN-PROCESS CONTROLS

5.3.1 Mating Verification
Mating Verification shall be performed in accordance with Para. 8.8.

5.3.2 Dimension Check
Dimension Check shall be performed in accordance with Para. 8.7 on a sample of 3 components selected from each lot.

In the event of any failure a 100% Dimension Check shall be performed.

5.3.3 Weight
The maximum weight of the components specified in the Detail Specification shall be guaranteed but not tested.

5.3.4 Documentation
Documentation of Special In-Process Controls shall be in accordance with Para. 9.6.

6 SCREENING TESTS

6.1 GENERAL

Unless otherwise specified herein or in the Detail Specification, all lots of components used for qualification and qualification maintenance, Lot Validation Testing, and for delivery, shall be subjected to tests and inspections in accordance with Chart F3 in the sequence shown.

All components shall be serialised prior to the tests and inspections.

Any components which do not meet these requirements shall be removed from the lot and at no future time be resubmitted to the requirements of this specification.

The applicable test methods and conditions are specified in the paragraphs referenced in Chart F3.

6.2 FAILURE CRITERIA

6.2.1 Environmental and Mechanical Test Failure

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, i.e., Rapid Change of Temperature, External Visual Inspection.

6.2.2 Parameter Drift Failure

The acceptable change limits are shown in Parameter Drift Values in the Detail Specification. A component shall be counted as a parameter drift failure if the changes during Burn-in are larger than the drift values (Δ) specified.

6.2.3 Parameter Limit Failure

A component shall be counted as a limit failure if one or more parameters exceed the limits shown in Room Temperature Electrical Measurements or High and Low Temperatures Electrical Measurements in the Detail Specification.

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

6.2.4 Other Failures

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

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

6.3 FAILED COMPONENTS

A component shall be considered as a failed component if it exhibits one or more of the failure modes described in Para. 6.2.

6.4 LOT FAILURE

If the number of components failed on the basis of the failure criteria specified in Paras. 6.2.2 and 6.2.3 exceeds 10% (rounded upwards to the nearest whole number) of the components submitted to Burn-in, the lot shall be considered as failed.

If a lot is composed of groups of components of one family defined in one ESCC Detail Specification, but separately identifiable for any reason, then the lot failure criteria shall apply separately to each identifiable group.

In the case of lot failure, the Manufacturer shall act in accordance with Para. 4.3.3.

6.5 DOCUMENTATION

Documentation of Screening Tests shall be in accordance with Para. 9.7.

7 QUALIFICATION, QUALIFICATION MAINTENANCE AND LOT VALIDATION TESTING

The requirements of this paragraph are applicable to the tests performed on components or test structures as part of qualification or qualification maintenance in accordance with either ESCC Basic Specification No. 20100 or 25400 as applicable. They are also applicable to Lot Validation Testing as part of the procurement of qualified or unqualified components.

7.1 QUALIFICATION TESTING

7.1.1 General

Qualification testing shall be in accordance with the requirements specified in Chart F4. The tests of Chart F4 shall be performed on the specified sample, chosen at random from connectors which have successfully passed the tests in Chart F3 and contacts which have successfully passed the Requirements for Contacts tests in Chart F2. 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 F4.

The conditions governing qualification testing are specified in ESCC Basic Specification No. 20100.

7.1.2 Distribution within the Qualification Test Lot

A sample of 16 mated connector sets (this shall comprise 8 connectors with male filter contacts mated with 8 connectors with female non-filter contacts and 8 connectors with female filter contacts mated with 8 connectors with male non-filter contacts) and a minimum of 70 contact pairs shall be submitted to qualification testing per Chart F4. The distribution within the sample shall be as follows:

The connectors selected for qualification testing shall be representative of the range and termination types to be qualified and include at least the minimum and maximum sizes. The contact sets selected for qualification testing shall represent the range of contacts (filter types) to be used in the connector series being qualified. The testing of Chart F4 Subgroup 1C shall be repeated for each variation of female contact engagement end (functional part) technology.

The distribution may be specified by, but in any case, shall be agreed with the ESCC Executive.

7.2 QUALIFICATION WITHIN A TECHNOLOGY FLOW

The qualification of a component produced using a qualified Technology Flow shall be in accordance with ESCC Basic Specification No. 25400.

7.3 QUALIFICATION MAINTENANCE (PERIODIC TESTING)

Qualification is maintained through periodic testing and the test requirements of Para. 7.1 shall apply. For each subgroup, the sample size and the period between successive subgroup testing shall be as specified in Chart F4.

The conditions governing qualification maintenance are specified in ESCC Basic Specification No. 20100.

Qualification of a component, produced using a qualified Technology Flow, is maintained by the maintenance of the Technology Flow Qualification itself in accordance with ESCC Basic Specification No. 25400.

7.4 LOT VALIDATION TESTING

For procurement of qualified components, Lot Validation Testing is not required and shall only be performed if specifically stipulated in the Purchase Order.

For procurement of unqualified components, the need for Lot Validation Testing shall be determined by the Orderer (ref. ESCC Basic Specification No. 23100).

When Lot Validation Testing is required, it shall consist of the performance of one or more of the tests or subgroup test sequences of Chart F4. The testing to be performed and the sample size shall be as stipulated in the Purchase Order.

When procurement of more than one component type is involved from a family, range or series, the selection of representative samples shall also be stipulated in the Purchase Order.

7.5 FAILURE CRITERIA

The following criteria shall apply to qualification, qualification maintenance and Lot Validation Testing.

7.5.1 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, etc.

7.5.2 Electrical Failures

The following shall be counted as component failures:

- Components which fail one or more of the applicable limits at each of the relevant data points specified for environmental, mechanical and endurance testing in Intermediate and End-Point Electrical Measurements in the Detail Specification.

7.5.3 Other Failures

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

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

7.6 FAILED COMPONENTS

A component shall be considered as failed if it exhibits one or more of the failure modes detailed in Para. 7.5.

When requested by the ESCC Executive (for qualification, qualification maintenance or procurement of qualified components) or the Orderer (for procurement of qualified or unqualified components), failure analysis of failed components shall be performed under the responsibility of the Manufacturer and the results provided.

Failed components shall be retained at the Manufacturer's plant until the final disposition has been agreed and certified.

7.7 LOT FAILURE

For qualification and qualification maintenance, the lot shall be considered as failed if one component in any subgroup of Chart F4 is a failed component based on the criteria specified in Para. 7.5.

For procurement, the lot shall be considered as failed if one component in any test specified for Lot Validation Testing is a failed component based on the criteria specified in Para. 7.5.

In the case of lot failure, the Manufacturer shall act in accordance with Para. 4.3.3.

7.8 QUALIFICATION, QUALIFICATION MAINTENANCE AND LOT VALIDATION TESTING SAMPLES

All tests of Chart F4 are considered to be destructive and therefore components so tested shall not form part of the delivery lot.

7.9 DOCUMENTATION

Documentation of qualification, qualification maintenance and Lot Validation Testing shall be in accordance with Para. 9.8.

8 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.

For a qualified component, documentation supporting the change shall be approved by the ESCC Executive and retained by the Manufacturer. It shall be copied, when requested, to the ESCC Executive. The change shall be specified in an appendix to the Detail Specification and in the PID.

For an unqualified component the change shall be approved by the Orderer. The change may be specified in an appendix to the Detail Specification at the request of the Manufacturer or Orderer, subject to the approval of the ESCC Executive.

8.1 GOLD PLATE POROSITY

Contacts shall be placed in a clean glass container. A solution of 1 part of concentrated nitric acid (specific gravity: 1.42) and 1 part of distilled water at a temperature of +25 ±5°C shall be poured over the contacts. No bubbles shall emanate from the contact surfaces within 15 seconds from application of the solution.

8.2 PLATING THICKNESS

The thickness of the outer gold layer and barrier layers of the contacts shall be measured using a non-destructive method or metallographic cross section on the active part as specified in the Detail Specification. In the event of conflict, the metallographic cross sectioning method shall govern (see the Detail Specification for values).

8.3 CONTACT VISUAL INSPECTION

ESCC Basic Specification No. 20500 for contact bodies.

ESCC Basic Specification No. 20400 for filter elements.

8.4 OPERATING LIFE TEST FOR FILTER CONTACTS

Filter contacts shall be subjected to the following test:

- Duration: 2000 hours minimum.
- Test Conditions: as specified in Para. 8.28, Operating Life and in the Detail Specification.
- Data Points:
  Parameter Drift Values as specified in the Detail Specification shall be measured at 0 hours and, following a recovery period of 24 hours maximum, at both 1000 ±48 hours and 2000 ±48 hours. Parameter drift from the initial measurements shall be calculated (on a go-no-go basis) as specified in Parameter Drift Values in the Detail Specification.

8.5 CONTACT CAPABILITY

Contact Capability is applicable to female contacts or to male contacts where the male contact deforms to make and retain electrical contact.

The contacts shall pick up the minimum weight and drop the maximum weight. These weights shall be as specified in the Detail Specification.

8.6 BURN-IN

In accordance with IEC Publication No. 60384-1 clause 4.23. Unless otherwise specified, the following details shall apply:

- Test Conditions:
  - Duration:
    During Requirements for Contacts (Chart F2): 168 hours minimum.
    During Screening Tests (Chart F3): 48 hours minimum.
  - Temperature: maximum operating temperature rating (+0 -3)°C, as specified in the Detail Specification.
  - Applied voltage: as specified in Burn-in in the Detail Specification.
- Data Points:
  At the end of the burn-in period and while still at the burn-in temperature, the Insulation Resistance shall be measured as specified in Para. 8.10.1.1 and shall meet the limits specified in the Detail Specification.

8.7 EXTERNAL VISUAL INSPECTION AND DIMENSION CHECK

External Visual Inspection shall be performed in accordance with ESCC Basic Specification No. 20500.

Dimension Check shall be performed in accordance with ESCC Basic Specification No. 20500.

8.8 MATING VERIFICATION

The connectors shall be mated and unmated once with their counterparts to verify the proper functioning of the coupling mechanism.

8.9 RAPID CHANGE OF TEMPERATURE

Connectors shall be subjected to Test Nb of IEC Publication No. 60068-2-14. The following details shall apply:

- Number of cycles: 5
  For Screening Tests (Chart F3), one cycle shall consist of the following steps:
  1) 30 minutes at the minimum operating temperature (+3 -0)°C, as specified in the Detail Specification.
  2) 5 minutes (maximum) at T_{amb} = +25 (+10 -5)°C
  3) 30 minutes at the maximum operating temperature (+0 -3)°C, as specified in the Detail Specification.
  4) 5 minutes (maximum) at T_{amb} = +25 (+10 -5)°C

  For Qualification, Periodic Testing and Lot Validation Testing (Chart F4), one cycle shall consist of the following steps:
  1) 30 minutes at the minimum storage temperature (+3 -0)°C, as specified in the Detail Specification.
  2) 5 minutes (maximum) at T_{amb} = +25 (+10 -5)°C
  3) 30 minutes at the maximum storage temperature (+0 -3)°C, as specified in the Detail Specification.
  4) 5 minutes (maximum) at T_{amb} = +25 (+10 -5)°C

- Data Points:
  On completion of testing the connectors shall be visually examined. There shall be no damage detrimental to the operation of the connectors.

  During Qualification, Periodic Testing and Lot Validation Testing (Chart F4) only, Insertion Loss, Capacitance, Insulation Resistance and Voltage Proof shall then be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

8.10 ELECTRICAL MEASUREMENTS

8.10.1 General

Unless otherwise specified in the Detail Specification, the following electrical measurements and test methods apply.

8.10.1.1 Insulation Resistance

In accordance with IEC Publication No. 60384-1 clause 4.5. Unless otherwise specified, the following details shall apply:

- Test voltage: as specified in the Detail Specification.
- Measurement accuracy: ±10% from one-hundredth of the limit value to 100GΩ
- Time constant of the test circuit including component under test: < 1s
- Charging current: 50μA/pF maximum for C ≤ 1000pF; 50mA maximum for C > 1000pF
- Relative humidity: 20 to 50%

The correction factors to be applied to the insulation resistance measurements are shown below:

°C	Correction Factor
19	1.52
20	1.42
21	1.33
22	1.24
23	1.16
24	1.08
25	1

8.10.1.2 Voltage Proof

In accordance with IEC Publication No. 60384-1 clause 4.6. Unless otherwise specified, the following details shall apply:

- Test voltage: as specified in the Detail Specification.
- Test voltage application time: 60 seconds between the test points.
- Time constant of the test circuit including component under test: < 1s
- Voltmeter resistance: ≥ 20000Ω/V
- Charging/discharging current: 50μA/pF maximum for C ≤ 1000pF; 50mA maximum for C > 1000pF

There shall be no visible or electrical sign of breakdown or flash-over during the test period and, after completion of the test, the components shall be further visually examined for evidence of damage, arcing or breakdown.

8.10.1.3 Contact Resistance

The Contact Resistance at Low Level and Rated Current shall be measured by means of a suitable test circuit. Where measurements are to be made on contacts mounted in connectors, they shall be made at the point at which the rear part of the contact emerges from the insert.

- Contact Resistance at Low Level:
  Contact Resistance at Low Level shall be measured using either the DC or AC method shown below. In case of dispute the DC method shall govern.
  - DC Method:
    - Maximum potential across sample: 20mV
    - Maximum applied current: 10mA

    Two measurements shall be performed with opposite polarity. The average of the two readings shall be recorded as the Contact Resistance value.
  - AC Method:
    - Maximum potential across sample: 20mVrms
    - Maximum measuring frequency: 2kHz
    - Maximum applied current: 10mArms

- Contact Resistance at Rated Current:
  Contact Resistance at Rated Current shall be measured using either the DC or AC method shown below. In case of dispute the DC method shall govern.
  Testing shall not be performed until thermal stability has been achieved. Thermal stability will have been reached when no change in resistance is observed between two successive measurements taken at 15 minute intervals.
  - DC Method:
    - Potential across sample: from 1V to 60V
    - Maximum applied current: Maximum Rated Current (I_R), as specified in the Detail Specification.

    Two measurements shall be performed with opposite polarity. The average of the two readings shall recorded as the Contact Resistance value.
  - AC Method:
    - Potential across sample: from 1Vrms to 60Vrms
    - Maximum measuring frequency: 2kHz
    - Maximum applied current: Maximum Rated ACrms Current (I_{Rac}), as specified in the Detail Specification.

- Sampling (applicable to measurements of contacts mounted in connectors):
  - Number of contacts in connector ≤ 4: All contacts in each connector shall be measured.
  - Number of contacts in connector > 4: 20%, but not less than 4, of the contacts in each connector shall be measured.

8.10.1.4 Ground Resistance

Ground Resistance is applicable to grounded contacts mounted in connectors. Measurements shall be made between the point at which the rear part of the contact emerges from the insert to a point on the rear accessory thread (or body, if no thread is present) for a plug, or to a point on the mounting flange for a receptacle.

Probes with spherical ends of 0.13mm radius shall be used to make the measurements.

- Test Conditions:
  Measurements of Ground Resistance shall be made using either the DC or the AC method shown below. In case of dispute the DC method shall govern.
  - DC Method
    - Maximum Potential Across Sample: 20mV
    - Maximum Applied Current: 10mA

    Two measurements shall be performed with opposite polarity. The average of the two readings shall be recorded as the Ground Resistance value.
  - AC Method
    - Maximum Potential Across Sample: 20mVrms
    - Maximum Measuring Frequency: 2kHz
    - Maximum Applied Current: 10mArms

- Sampling (applicable to measurements of grounded contacts mounted in connectors):
  - Number of contacts in connector ≤ 4: All contacts in each connector shall be measured.
  - Number of contacts in connector > 4: 20%, but not less than 4, of the contacts in each connector shall be measured.

8.10.1.5 Capacitance

In accordance with IEC Publication No. 60384-1 clause 4.7. Unless otherwise specified, the following details shall apply:

- Test frequency: 1000 ±100Hz
- Measuring voltage: 0.1 to 1.2Vrms

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

- 10% of the rated capacitance tolerance (absolute capacitance measurements)
- 10% of the specified change in capacitance (measurement of variation in capacitance).

Temperature variation due to handling shall be avoided.

N.B.: following Voltage Proof or Insulation Resistance, the capacitance measurement may be delayed for a period of up to 24 hours.

8.10.1.6 Insertion Loss

Insertion Loss shall be performed in accordance with ESCC Basic Specification No. 24400 and as follows:

- Measurement Accuracy: ≤ ±3dB
- Requirements:
  The same test circuit may be employed in measurements at all test temperatures. Where applicable, temperature chamber cables of a maximum length of 600mm with PTFE or equivalent dielectric may be interposed between each buffer network and the component under test.
- Measurements during Screening Tests (Chart F3) and Periodic Testing for extension of qualification (Chart F4):
  Measurements shall be made at a minimum of three test frequencies which shall be as specified in the Detail Specification.
- Measurements during Qualification Testing and Periodic Testing for renewal of qualification after lapse (Chart F4):
  Measurements shall be made at a minimum of five test frequencies which shall be as specified in the Detail Specification.

8.10.2 Parameter Drift Values (Chart F3)

Only applicable to filter contacts.

At each of the relevant data points during Screening Tests, Parameter Drift Values shall be measured as specified in the Detail Specification. All values obtained shall be recorded against serial numbers and the parameter drift calculated.

8.10.3 High and Low Temperatures Electrical Measurements (Chart F3)

High and Low Temperatures Electrical Measurements shall be performed as specified in the Detail Specification. All values obtained shall be recorded against serial numbers.

8.10.4 Room Temperature Electrical Measurements (Chart F3)

Room Temperature Electrical Measurements shall be performed as specified in the Detail Specification. All values obtained shall be recorded against serial numbers.

8.10.5 Intermediate and End-Point Electrical Measurements (Chart F4)

At each of the relevant data points during Qualification, Periodic Testing and Lot Validation Testing, Intermediate and End-Point Electrical Measurements shall be performed as specified in the Detail Specification. All values obtained shall be recorded against serial numbers and the parameter drift calculated if specified.

8.11 WIRING

- Selection of Wire:
  The wire to be used shall be of the minimum and maximum gauge that the solder bucket is designed to accept. The insulation shall be capable of surviving, without any degradation in performance, the same maximum temperature as the connector. Additionally, ECSS-Q-ST-70-08 shall be used to aid the selection of wire.

- Procedure:
  The wires shall be soldered to the contacts in accordance with the requirements of ECSS-Q-ST-70-08. Half of the contacts shall be equipped with wire of the maximum gauge and half with the minimum gauge.

- Data Points:
  The soldered joints shall be examined in accordance with, and meet the requirements of, the visual inspection criteria of ECSS-Q-ST-70-08.

  Insertion Loss shall then be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

8.12 VIBRATION

Components shall be subjected to Sinusoidal Vibration per Test Fc of IEC Publication No. 60068-2-6 and Random Vibration per Test Fh, Method 1 of 60068-2-64. The order in which these tests shall be performed is at the Manufacturer's discretion. The following details shall apply:

- Mounting:
  The mated, wired connector sets shall be mounted either by their normal mounting means or by any suitable clamping arrangement. The wires shall be clamped to a non-vibrating point which is at least 20cm away from the connectors such that resonance of the wires is avoided.

- Test Conditions for Sinusoidal Vibration Testing:
  - Frequency range: 10 to 2000Hz
  - Duration: 1 cycle from 10-2000-10Hz, of duration 30 minutes, in each of the 3 mutually perpendicular directions, total 90 minutes.
  - Vibration amplitude: 1.5mm or 20g, whichever is less.

- Test Conditions for Random Vibration Testing:
  - Frequency range: f_1 = 20Hz, f_2 = 2000Hz
  - Duration: 1 cycle, of high reproducibility and duration 30 minutes, performed in each of the 3 mutually perpendicular directions, total 90 minutes.
  - Acceleration spectral density: $0.2g^2/Hz$

- Data Points:
  During Vibration, contacts shall be monitored as specified in Test 2e of IEC Publication No. 60512-2-5. Maximum contact disturbance time: 1µs.

  On completion of testing, the components shall be visually examined. There shall be no damage and no loosening of parts as a result of the vibration testing.

8.13 SHOCK

Components shall be subjected to Test Ea of IEC Publication No. 60068-2-27. The following details shall apply:

- Test Conditions:
  - Mounting: The mated, wired connector sets shall be mounted either by their normal mounting means or by any suitable clamping arrangement. The wires shall be clamped to a point which is at least 20cm away from the connectors such that stress of the wires is avoided.
  - Peak acceleration: 50g
  - Duration: 11ms
  - Waveform: ½-sine pulse.
  - Number of shocks: 3 shocks in each direction shall be applied in each of the 3 mutually perpendicular planes, total 18 shocks.

- Data Points:
  During Shock, contacts shall be monitored as specified in Test 2e of IEC Publication No. 60512-2-5. Maximum contact disturbance time: 1µs.

  On completion of testing, the components shall be visually examined. There shall be no damage and no loosening of parts as a result of the shock testing.

8.14 CLIMATIC SEQUENCE

8.14.1 Dry Heat

Components shall be subjected to Test Bb of IEC Publication No. 60068-2-2. The following details shall apply:

- Duration: 2 hours minimum.
- Test temperature: maximum storage temperature (+0 -3)°C, as specified in the Detail Specification.

8.14.2 Damp Heat, Accelerated (First Cycle)

Unless otherwise specified in the Detail Specification, components shall be subjected to Test Db of IEC Publication No. 60068-2-30, upper temperature severity +55°C, Variant 2 for 1 cycle. Following the damp heat cycle the components shall be subjected to standard atmospheric conditions for a recovery period of 1 to 24 hours. The components shall be subjected to Cold immediately after the recovery period.

8.14.3 Cold

Components shall be subjected to Test Ab of IEC Publication No. 60068-2-1. The following details shall apply:

- Duration: 2 hours minimum.
- Test temperature: minimum storage temperature (+3 -0)°C, as specified in the Detail Specification.

8.14.4 Low Air Pressure

Components shall be subjected to Test M of IEC Publication No. 60068-2-13. One half of the connectors shall be mated, and the remaining connectors unmated, during the test. The following details shall apply:

- Maximum (simulated) altitude: 33000m
- Test temperature: +15 to +35°C.
- Duration: 1 hour.
- Voltage Proof: During the final 5 minutes of the period at low pressure a voltage proof test shall be carried out per Para. 8.10.1.2, except that the test voltage shall be 125% of the Rated Voltage specified in the Detail Specification.

8.14.5 Damp Heat, Accelerated (Remaining Cycles)

Components shall be subjected to Test Db of IEC Publication No. 60068-2-30, upper temperature severity +55°C, Variant 2 for 5 cycles.

- Data Points (Final Measurements):
  After the final Damp Heat cycle the Insulation Resistance shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification. Components shall then be subjected to standard atmospheric conditions for a recovery period of 1 to 24 hours.

  After recovery, the components shall be subjected to an External Visual Inspection in accordance with ESCC Basic Specification No. 20500. Insertion Loss, Capacitance, Insulation Resistance and Voltage Proof shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

8.15 MATING AND UNMATING FORCES

Components shall be mated and then unmated four times, with force applied gradually and equally distributed about the connector.

The mating and unmating forces shall be measured on the first and last mating/unmating cycles and shall not exceed the values specified in the Detail Specification.

8.16 HIGH TEMPERATURE STORAGE

Components shall be subjected to Test Bb of IEC Publication No. 60068-2-2. The following details shall apply:

- Duration: 1000 hours minimum.
- Test temperature: maximum storage temperature (+0 -3)°C, specified in the Detail Specification.
- Data Points:
  Prior to the commencement of the High Temperature Storage test, Contact Resistance at Low Level, Ground Resistance, Capacitance and Insulation Resistance shall be measured and shall meet the requirements specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

  On completion of the High Temperature Storage the components shall be visually examined and there shall be no evidence of physical damage. Connectors shall then be subjected to Mating and Unmating Forces as specified in Para. 8.15.

  Contact Resistance at Low Level, Contact Resistance at Low Level Drift, Ground Resistance, Capacitance, Capacitance Drift, Insertion Loss, Insulation Resistance, Insulation Resistance Drift and Voltage Proof shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification. Contact Resistance at Low Level Drift, Capacitance Drift and Insulation Resistance Drift shall be related to the initial measurements.

  The contacts shall then be subjected to the Contact Retention test as specified in Para. 8.25.

8.17 CORROSION

The unmated connectors shall be submitted to this test in accordance with Test Ka of IEC Publication No. 60068-2-11 for a duration of 48 hours.

- Data Points:
  On completion of testing, the components shall be visually examined. No base metal shall be exposed on the interfaces or mating surfaces.

8.18 INSERT RETENTION (IN SHELL)

Any rear accessories, if fitted, shall be removed from connectors prior to the test.

One half of the connectors shall be tested by applying an axial load to the front of the insert and the remaining connectors shall be tested by applying an axial load to the rear of the insert. The axial load shall be applied in such a manner as would push the insert out of the shell. The portion of the load-applying device that touches the surface of the insert may be shaped to clear the contacts (if installed), and similarly any raised areas (e.g., bosses, identifiers) on the insert.

The following details shall apply:

- Rate of increase of axial load application: 0.7kg/cm^2/s
- Maximum applied axial load: as specified in the Detail Specification.
- Duration: The maximum axial load shall be applied for a minimum of 5 seconds.
- Data Points:
  The connectors shall be visually and/or mechanically checked during and after the application of axial load. The inserts shall not be dislodged from their original position within the shells.

8.19 RESISTANCE TO SOLDERING HEAT

Components shall be subjected to Test Tb of IEC Publication No. 60068-2-20. The following details shall apply:

- Stabilisation:
  Prior to the test the components shall be stabilised at +22 ±3°C for a period of 15 minutes minimum.
- Test Conditions:
  - Test method: 1A (+260 ±5°C)
  - Immersion depth: 2 (+0.5 -0) mm from the component body.
  - Immersion time: 10 ±1 seconds.

  No heat sink or thermal screen shall be used during this test.
- Data Points:
  On completion of testing, the components shall be subjected to standard atmospheric conditions for a recovery period of 1.5 ±0.5 hours.

  After recovery, the components shall be visually examined. There shall be no evidence of damage. Insulation Resistance and Insertion Loss shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

8.20 ENGAGEMENT AND SEPARATION FORCES

Engagement and Separation Forces is applicable to female contacts or to male contacts where the male contact deforms to make and retain electrical contact.

- Sampling: 10 contacts per type shall be tested.
- Procedure:
  A gradually increasing force with displacement not exceeding 1mm/second shall be applied until the test pin, or sleeve, properly engages with, or separates from, the contact. The test pin, or sleeve, shall be made of hardened tool steel with a surface roughness of 0.1 to 0.25µm and a minimum hardness of 650 VPN. Test pins shall have spherical ends. The diameter of the test pin, or sleeve, shall be as specified in the Detail Specification.

  The maximum diameter test pin, or minimum diameter test sleeve, shall be engaged to 70% of the depth of the female mating cavity or length of the engagement end of a male contact, and then separated 3 times. Subsequently, the minimum diameter test pin, or maximum diameter test sleeve, shall be engaged and separated once to measure the separation force.
- Data Points:
  Engagement and separation forces shall be measured on the third engagement and separation of the maximum diameter test pin, or minimum diameter test sleeve. Separation force shall be measured for the minimum diameter test pin, or maximum diameter test sleeve.

  The maximum engagement force and the separation forces, as specified in the Detail Specification, shall not be exceeded.

8.21 OVERSIZE PIN EXCLUSION

A hardened steel pin with dimensions as specified in the Detail Specification shall be placed in the centre of the female contact, parallel to its axis. The force specified in the Detail Specification shall be applied, aimed at forcing the test pin into the female contact. The test pin shall not enter the female contact.

8.22 PROBE DAMAGE

Probe Damage is applicable to female contacts only.

Female contacts shall be subjected to Test 16a of IEC Publication No. 60512-16-1. The following details shall apply:

- Test pin dimensions: as specified in the Detail Specification.
- Bending moment: as specified in the Detail Specification.
- Data Points:
  On completion of the Probe Damage test, the contact separation force shall be measured and the separation forces, as specified in the Detail Specification, shall not be exceeded.

8.23 SOLDERABILITY

Contacts shall be subjected to Test Ta, Method 2 of IEC Publication No. 60068-2-20. The size of soldering iron (A or B) shall be as specified in the Detail Specification.

8.24 PIN BENDING TEST

Pin Bending Test is applicable to male contacts only.

- Procedure:
  Contacts shall be mounted into the insulator. The rear end shall be bent 90° to touch the insulator and then straightened.
- Data Points:
  On completion of the Pin Bending test the contacts shall be examined. Damage to the contact body is acceptable, but there shall be no evidence of damage to the filter.

  Capacitance and Insulation Resistance shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

8.25 CONTACT RETENTION (IN INSERT)

Any rear accessories, if fitted, shall be removed from connectors prior to the test. All contacts shall be in place and a minimum of 20%, but not less than 5 of the contacts in each connector, shall be tested. The force shall be applied to the engagement end of the contact either directly or by using an appropriate adaptor.

The following details shall apply:

- Rate of application of force: ≤ 5N/s
- Contact retention force: as specified in the Detail Specification.
- Duration: 5 seconds minimum.
- Data Points:
  After the force has been removed from the contact, the axial displacement of the contact shall be measured and shall not exceed 0.3mm.

8.26 ENDURANCE

The following details shall apply:

- Number of cycles: 500 for Qualification, 100 for Periodic Testing and Lot Validation Testing. One cycle shall consist of one mating followed by unmating of a mated connector set with the plug and receptacle completely separated after each cycle.
- Mating/unmating speed: 5mm per second maximum.
- Cycling rate: 8 cycles per minute maximum.
- Data Points:
  Prior to the commencement of the Endurance test, connectors shall be subjected to Mating and Unmating Forces as specified in Para. 8.15. Contact Resistance at Low Level, Ground Resistance, Capacitance and Insulation Resistance shall be measured and shall meet the requirements as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

  On completion of the Endurance test the components shall be visually examined and there shall be no evidence of physical damage other than contact wear. The components shall then be subjected to standard atmospheric conditions for a recovery period of 2 hours minimum.

  After recovery, the connectors shall be subjected to Mating and Unmating Forces as specified in Para. 8.15.

  The connectors shall not be cleaned prior to electrical measurements. Contact Resistance at Low Level, Contact Resistance at Low Level Drift, Ground Resistance, Insertion Loss, Capacitance, Capacitance Drift, Insulation Resistance, Insulation Resistance Drift and Voltage Proof shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification. Contact Resistance at Low Level Drift, Capacitance Drift and Insulation Resistance Drift shall be related to the initial measurements.

8.27 PERMANENCE OF MARKING

ESCC Basic Specification No. 24800.

8.28 OPERATING LIFE

Components shall be subjected to an endurance test in accordance with IEC Publication No. 60384-1 clause 4.23. Unless otherwise specified, the following details shall apply:

- Duration:
  - For Qualification Testing, and Periodic Testing for renewal of qualification after lapse: 2000 ±48 hours.
  - For Periodic Testing for extension of qualification: 1000 ±24 hours.
- Temperature: as specified in Operating Life in the Detail Specification.
- Applied voltage: as specified in Operating Life in the Detail Specification. If AC rated filters are tested, the value of the series resistor shall be such that the voltage appearing across the filter is not less than 95% of the applied voltage.
- A voltage source shall be used which is capable of supplying at least 1 ampere when a filter is short-circuited.
- Charging current: 50μA/pF maximum for C ≤ 1000pF; 0.05A maximum for C > 1000pF
- Monitoring during Operating Life: A method shall be provided to indicate short-circuits or leakage currents of 1mA or greater.

- Data Points:

  Prior to the commencement of the Operating Life test, Capacitance and Insulation Resistance shall be measured and shall meet the requirements specified in Intermediate and End-Point Electrical Measurements in the Detail Specification.

  For a 2000 hour Operating Life test, testing shall be stopped after 1000 ±48 hours for intermediate measurements. The components shall be subjected to standard atmospheric conditions for recovery for 24 hours maximum. Prior to the recovery period, the Insulation Resistance shall be measured at the specified operating life test temperature.

  After recovery, Insertion Loss, Capacitance, Capacitance Drift, Insulation Resistance, Insulation Resistance Drift and Voltage Proof at 90% of rated voltage shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification. Capacitance Drift and Insulation Resistance Drift shall be related to the initial measurements. On completion of intermediate electrical measurements, components shall be returned to Operating Life testing.

  On completion of testing (1000 or 2000 hours), the components shall be subjected to standard atmospheric conditions for recovery for 24 hours maximum. Prior to the recovery period, the Insulation Resistance shall be measured at the specified operating life test temperature.

  After recovery, Insertion Loss, Capacitance, Capacitance Drift, Insulation Resistance, Insulation Resistance Drift and Voltage Proof at 90% of rated voltage shall be measured as specified in Intermediate and End-Point Electrical Measurements in the Detail Specification. Capacitance Drift and Insulation Resistance Drift shall be related to the initial measurements.

9 DATA DOCUMENTATION

9.1 GENERAL

For the qualification, qualification maintenance and procurement for each lot, a data documentation package shall exist in a printed or electronic form.

This package shall be compiled from:

(a) Cover sheet (or sheets).
(b) List of equipment (testing and measuring).
(c) List of test references.
(d) Requirements for Contacts data (Chart F2).
(e) Special In-Process Controls data (Chart F2).
(f) Screening Tests data (Chart F3).
(g) Qualification, Periodic Testing and Lot Validation Testing (when applicable) data (Chart F4).
(h) Failed components list and failure analysis report (when applicable).
(i) Certificate of Conformity.

Items (a) to (i) inclusive shall be grouped, preferably as sub-packages and, for identification purposes, each page shall include the following information:

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

Whenever possible, documentation should preferably be available in electronic format suitable for reading using a compatible PC. The format supplied shall be legible, durable and indexed. The preferred storage medium is CD-ROM and the preferred file format is PDF.

9.1.1 Qualification and Qualification Maintenance

In the case of qualification or qualification maintenance, the items listed in Para. 9.1(a) to (i) are required.

9.1.2 Component Procurement and Delivery

For all deliveries of components procured to this specification, 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.

9.1.3 Additional Documentation

The Manufacturer shall deliver additional documentation containing data and reports to the Orderer, if stipulated in the Purchase Order.

9.1.4 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 for review, if requested, by the Orderer or the ESCC Executive (for qualified components).

9.2 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 ESCC Generic Specification, including issue and date.
(c) ESCC Component Number and the Manufacturer's part type number.
(d) Lot identification.
(e) Range of delivered serial numbers.
(f) Number of the Purchase Order.
(g) Information relative to any additions to this specification and/or the Detail Specification.
(h) Manufacturer's name and address.
(i) Location of the manufacturing plant.
(j) Signature on behalf of Manufacturer.
(k) Total number of pages of the data package.

9.3 LIST OF EQUIPMENT USED

A list of equipment used for tests and measurements shall be prepared. 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.

9.4 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.

9.5 REQUIREMENTS FOR CONTACTS DATA (CHART F2)

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

9.6 SPECIAL IN-PROCESS CONTROLS DATA (CHART F2)

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

9.7 SCREENING TESTS DATA (CHART F3)

A test result summary shall be compiled showing the total number of components submitted to and the total number rejected after each of the tests. For each test requiring electrical measurements, the results shall be recorded against component serial number. Component drift calculations shall be recorded for each specified test against component serial number.

9.8 QUALIFICATION, PERIODIC TESTING AND LOT VALIDATION TESTING DATA (CHART F4)

9.8.1 Qualification Testing

A test result summary shall be compiled showing the components submitted to, and the number rejected after each test in each subgroup. Component serial numbers (if applicable) for each subgroup shall be identified. For each test requiring electrical measurements the results shall be recorded against component serial number. Where a drift value is specified during a test the drift calculation shall be recorded against component serial number.

9.8.2 Periodic Testing for Qualification Maintenance

A test result summary shall be compiled showing the components submitted to and the number rejected after each test in each subgroup. Component serial numbers (if applicable) for each subgroup shall be identified. For each test requiring electrical measurements the results shall be recorded against component serial number. Where a drift value is specified during a test the drift calculation shall be recorded against component serial number.

In addition to the full test data, a report shall be compiled for each subgroup of Chart F4 to act as the most recent Periodic Testing summary. These reports shall include a list of all tests performed in each subgroup, the ESCC Component Numbers and quantities of components tested, a statement confirming all the results were satisfactory, the date the tests were performed and a reference to the full test data.

9.8.3 Lot Validation Testing

A test result summary shall be compiled showing the components submitted to and the number rejected after each test in each subgroup (as applicable). Component serial numbers (if applicable) for each subgroup shall be identified. For each test requiring electrical and mechanical measurements, the results shall be recorded against component serial number. Where a drift value is specified during a test, the drift calculation shall be recorded against component serial number.

9.9 FAILED COMPONENTS LIST AND FAILURE ANALYSIS REPORT

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

(a) The reference and description of the test or measurement performed as defined in this specification and/or the Detail Specification during Requirements for Contacts, Special In-Process Controls, Screening Tests and Qualification, Periodic Testing and Lot Validation Testing.
(b) Traceability information including serial number (if applicable) of the failed component.
(c) The failed parameter and the failure mode of the component.
(d) Detailed failure analysis (if requested by the ESCC Executive or Orderer).

9.10 CERTIFICATE OF CONFORMITY

A Certificate of Conformity shall be established in accordance with the requirements of ESCC Basic Specification Nos. 20100 or 25400.

10 DELIVERY

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

(a) The delivery lot.
(b) The components used for Lot Validation Testing (as applicable), but not forming part of the delivery lot, if stipulated in the Purchase Order.
(c) The relevant documentation in accordance with the requirements of Paras. 9.1.2 and 9.1.3.

In the case of a component for which a valid qualification is in force, all data of all components submitted to Lot Validation Testing shall also be copied, when requested, to the ESCC Executive.

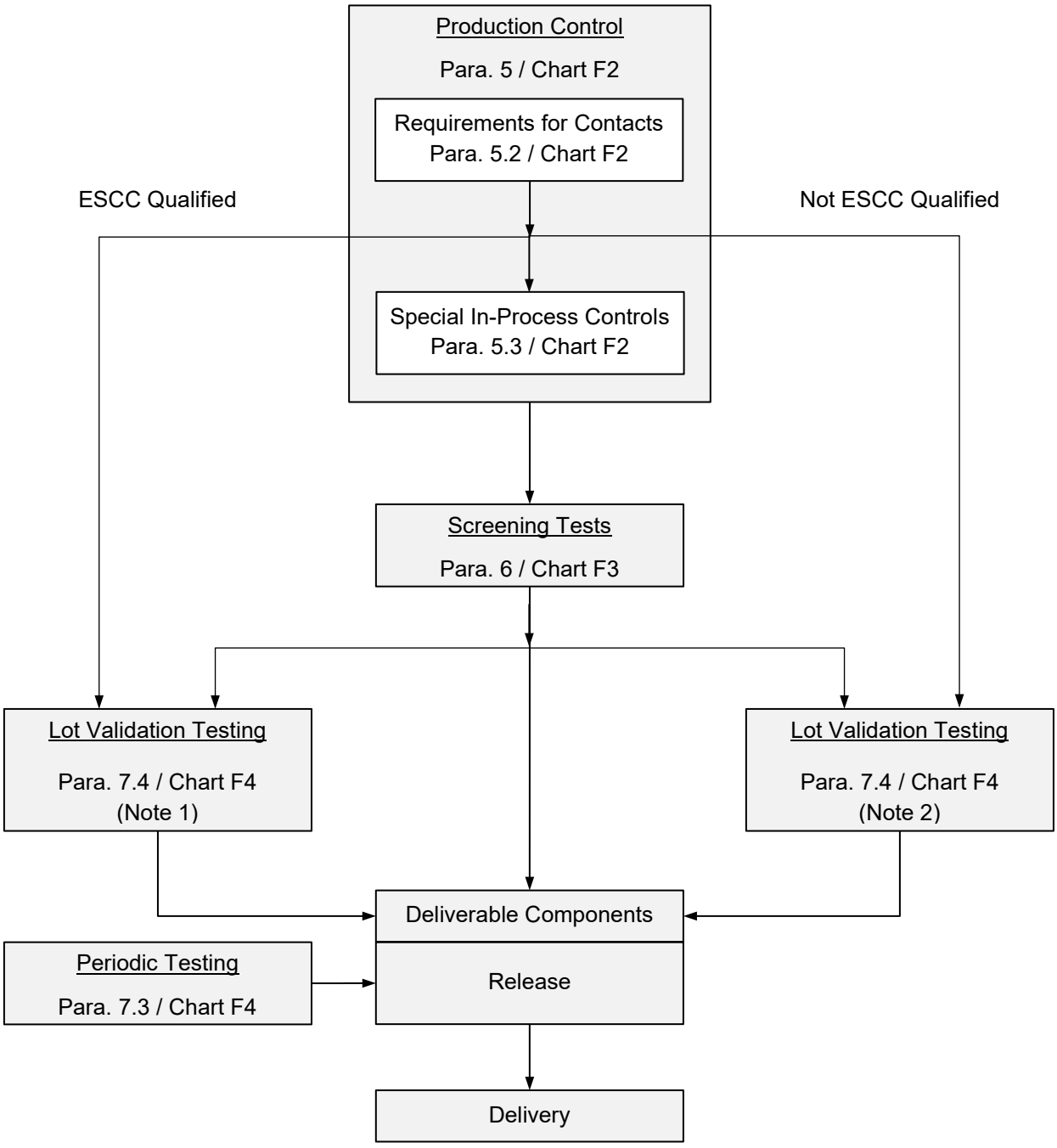
For qualification or qualification maintenance, the disposition of the Qualification Test Lot and its related documentation shall be as specified in ESCC Basic Specification Nos. 20100 or 25400 and the relevant paragraphs of Section 9 of this specification.

11 PACKAGING AND DESPATCH

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

12 CHARTS

12.1 CHART F1 – GENERAL FLOW OF PROCUREMENT



NOTES:

1. Lot Validation Testing is not required for qualified components unless specifically stipulated in the Purchase Order.
2. For unqualified components the need for Lot Validation Testing shall be determined by the Orderer and the required testing shall be as stipulated in the Purchase Order (ref. ESCC Basic Specification No. 23100).

12.2 CHART F2 – PRODUCTION CONTROL

COMPONENT LOT MANUFACTURING	
↓	
REQUIREMENTS FOR CONTACTS	
Para. 5.2.1	Gold Plate Porosity (1) (2)
Para. 5.2.2	Plating Thickness (1) (2)
Para. 5.2.3	Contact Visual Inspection (3)
-	Filter Element assembly into Contact Bodies (3)
Para. 5.2.4	Operating Life Test for Filter Contacts (1) (3)
Para. 5.2.5	Contact Capability (2) (4)
Para. 5.2.6	Electrical Measurements (Contacts) (Initial) (3)
Para. 5.2.7	Burn-in (Contacts) (3)
Para. 5.2.6	Electrical Measurements (Contacts) (Final) (3)
Para. 5.2.8	External Visual Inspection (Contacts)
↓ (5)	
SPECIAL IN-PROCESS CONTROLS	
-	Installation of contacts into connector bodies
Para. 5.3.1	Mating Verification
Para. 5.3.2	Dimension Check (1)
Para. 5.3.3	Weight (6)
↓	
TO CHART F3 – SCREENING TESTS	

NOTES:

1. Performed on a sample basis.
2. These tests do not have to be repeated if performed as part of the Manufacturer's standard process.
3. Only required for Filter Contacts.
4. If applicable.
5. Contacts are selected here for Chart F4 testing when required.
6. Guaranteed but not tested.

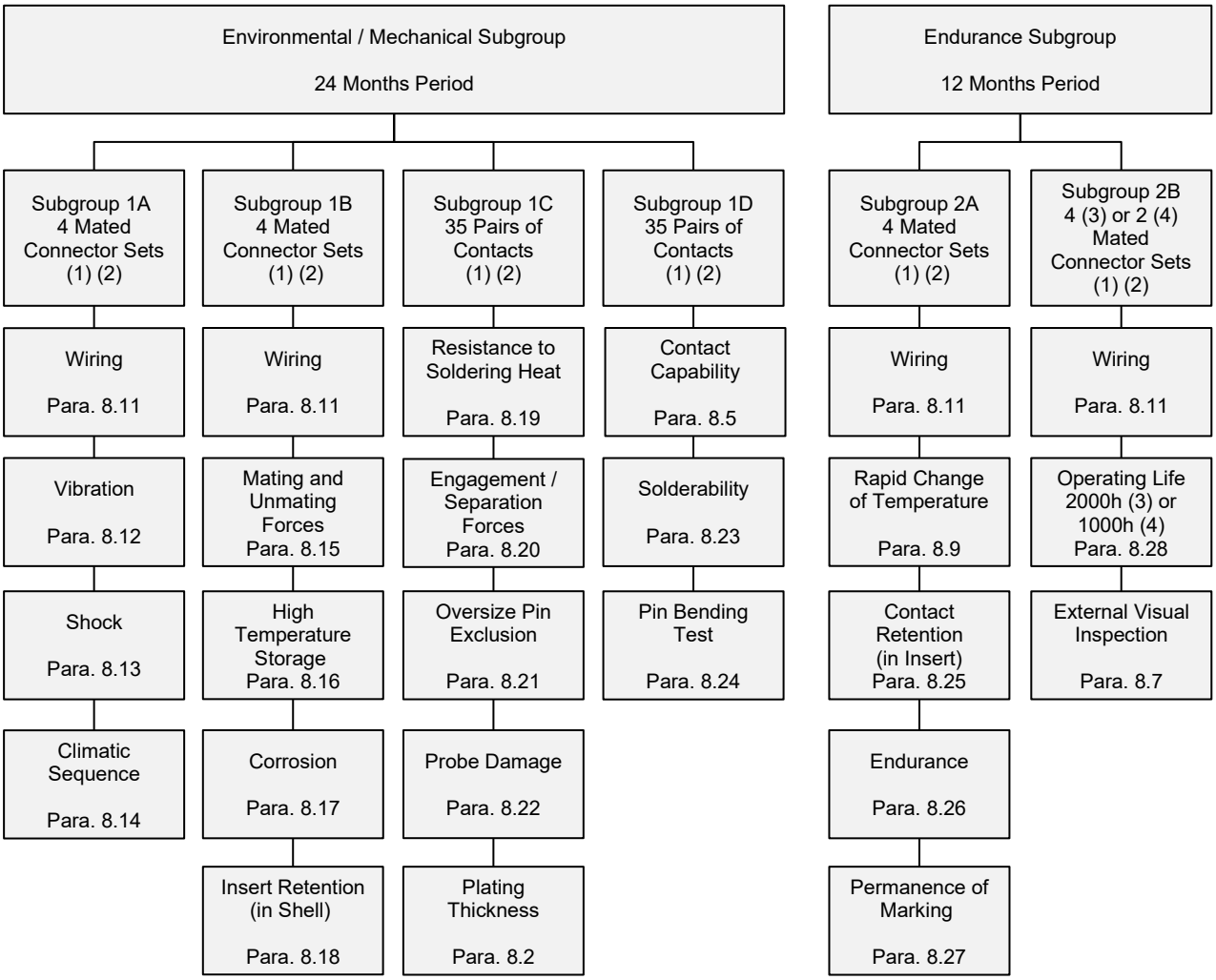
12.3 CHART F3 – SCREENING TESTS

COMPONENTS FROM PRODUCTION CONTROL	
Para. 6.1	Serialisation
Para. 8.9	Rapid Change of Temperature
Para. 8.10.4	Room Temperature Electrical Measurements
Para. 8.6	Burn-in (Connectors)
Para. 8.10.2	Parameter Drift Values (1)
Para. 8.10.3	High and Low Temperatures Electrical Measurements (1)
Para. 8.10.4	Room Temperature Electrical Measurements (1) (2)
Para. 6.4	Check for Lot Failure (3)
Para. 8.7	External Visual Inspection
TO CHART F4 WHEN APPLICABLE	

NOTES:

1. The lot failure criteria of Para. 6.4 apply to this test.
2. Measurements of the parameters included in Parameter Drift Values need not be repeated.
3. Check for Lot Failure shall take into account all electrical parameter failures that may occur during Screening Tests in accordance with Paras. 8.10.2, 8.10.3 and 8.10.4 subsequent to Burn-in.

12.4 CHART F4 – QUALIFICATION, PERIODIC TESTING AND LOT VALIDATION TESTING



NOTES:

1. For distribution within the subgroups, see Para. 7.1.2 for qualification and qualification maintenance, and Para. 7.4 for Lot Validation Testing.
2. No failures are permitted.
3. Applicable to Qualification Testing, and Periodic Testing for renewal of qualification after lapse.
4. Applicable to Periodic Testing for extension of qualification.