CROSS-REFERENCE OF ESCC, US-MIL AND IEC TEST METHODS

ESCC Basic Specification No. 24700

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DCR No.	CHANGE DESCRIPTION
849	Specification upissued to incorporate editorial changes per DCR.

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1 SCOPE

This specification provides a cross-reference between test methods specified in ESCC Generic and Detail Specifications and equivalent US-MIL and IEC test methods. Where a basic equivalence exists the necessary details are specified to permit the direct replacement of the specified test method by the equivalent test method.

2 APPLICABLE DOCUMENTS

The following specifications form part of, and shall be read in conjunction with, this specification:

- The relevant ESCC Basic, Generic and Detail Specifications.
- The relevant US-MIL and IEC Test Methods.

3 APPLICABILITY

A qualified Manufacturer of ESCC components may freely substitute any test method specified in the relevant ESCC Generic or Detail specification by the equivalent test method specified herein. Such substitution must be reflected in the Manufacturer's Process Identification Document (PID) but does not require an appendix to the relevant Detail Specification.

For unqualified Manufacturers this specification shall serve as a guideline for establishing agreement, between the Manufacturer and the Orderer, concerning test method substitutions. When a specified test method is substituted by the equivalent test method defined herein the Manufacturer shall be deemed, in this respect, to be in compliance with the requirements of the relevant ESCC Generic and Detail Specifications.

In all cases equivalence is related to the specific issue status of the relevant test methods as specified herein. Equivalence and hence substitution may be invalidated by a change to either the ESCC specified test method or to a presently equivalent test method. This specification will be updated periodically to reflect changes to pertinent test methods but the Manufacturer is responsible at all times for ensuring that a test method utilised is either that directly specified by ESCC or one for which the equivalence is established and valid.

4 INTRODUCTION

The purpose of the Test Method Cross-Reference is to enable alternative equivalent test methods, from those specified in the ESCC System, to be used.

The test methods in question are those specified for the performance of Special In-process Controls, Final Production Tests (Chart II), Burn-in and Electrical Measurements (Chart III), Qualification Tests (Chart IV) and Lot Acceptance Tests (Chart V) in ESCC Generic Specifications.

ESCC Generic Specifications specify:

- Technical test methods defined within ESCC Basic Specifications.
- IEC test methods.
- US-MIL Standard test methods.
- Test methods completely defined within the Generic Specifications.

An ESCC Detail Specification may modify a test method specified in a Generic Specification and, by so doing, may invalidate an equivalence established within this specification.

This cross-reference of ESCC, US-MIL and IEC test methods defines the equivalence of each test method of one system to the corresponding method or methods of the other systems. The degree of equivalence is defined so as to fall into one of three categories:

(a) Equivalent - The test methods are identical in respect of their application to the components under test, i.e. the components are subjected to identical handling, stimuli and stresses.
(b) Equivalent if specific amendments are made to the substitute test method.
(c) Not equivalent.

The issue status of the ESCC Generic Specifications and of the test methods compared, appears as Appendix 'A' of this specification.

5 TEST METHODS SPECIFICATION CROSS-REFERENCE

In the text that follows, the test methods are set out in a generally numerical order. For ease of reference, these test methods have been grouped under the headings of MIL-STD-202 (Test Methods for Electronic and Electrical Component Parts), MIL-STD-750 (Test Methods for Semiconductor Devices) and MIL-STD-883 (Test Methods and Procedures for Microelectronics).

An additional heading, "IEC and Other Test Methods", identifies test methods referenced in the ESCC Generic Specifications which are not from the MIL-STD system.

The purpose of the test is given with a brief assessment of the test methods under review, a statement as to their equivalence and any test method amendments required to establish an equivalence.

SPECIFICATION CROSS REFERENCE – SUMMARY: MIL-STD-202, IEC AND OTHER TEST METHODS

IEC and Other Test Methods	MIL-STD-202 Test Methods																								MIL-STD-105	No Identified Equivalent
	101	103	104	105	106	107	108	112	204	208	210	211	213	214	215	301	302	303	305	307	308	310	311	312		
IEC 115-1							E*									E*	E*	E*								
IEC 195																					E					
IEC 384-1							E*									E*	E*		E*							
IEC 410																									E	
IEC 444-2																										N
IEC 512-2/4/6/8																										N
IEC 68-2-1						E*																				
IEC 68-2-2							E*																			
IEC 68-2-3		E*																								
IEC 68-2-4																										N
IEC 68-2-6									E*																	
IEC 68-2-11	E*																									
IEC 68-2-13				E																						
IEC 68-2-14			E*			E*																				N
IEC 68-2-17								E																		
IEC 68-2-20										E	E															
IEC 68-2-21												E														
IEC 68-2-27													E													
IEC 68-2-29													E*													
IEC 68-2-30					E*																					
IEC 68-2-35														E*												
IEC 68-2-38					E																					

IEC and Other Test Methods	MIL-STD-202 Test Methods																								MIL-STD-105	No Identified Equivalent
	101	103	104	105	106	107	108	112	204	208	210	211	213	214	215	301	302	303	305	307	308	310	311	312		
IEC 68-2-45															E											
IEC 255-5																E*	E*									
ESCC 20500																										N
ESCC 20600																										N
ESCC 24800															E*											
FED-STD-3211																										N
FED-STD-228, TM 6031																										N
FED-STD-228, TM 6041																										N
FED-STD-228, TM 6111																										N
FED-STD-228, TM 6211																										N
ASTM B 298-94																										N
No Identified Equivalent							N*									N*	N*	N*		N		N	N	N		

NOTES
E = Equivalent.
N = No identified equivalent.
* = Refer to comparison tables for further detail on equivalence status.

MIL-STD-202, TEST METHOD 101

SALT SPRAY

The salt spray test is a corrosion test in which the specimens are subjected to a fine mist of salt solution.

IEC 68-2-11, TEST Ka
The IEC 68-2-11, Test Ka, Salt Mist, provides an equivalent test to the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 101, is equivalent to IEC 68-2-11 Test Ka with the required test duration added.

MIL-STD-202, TEST METHOD 104

IMMERSION

The immersion test is required to determine the effectiveness of the seal of a component part.

IEC 68-2-14, TEST Nc
A similar IEC test method is found in IEC 68-2-14, Test Nc: Rapid Change of Temperature, two fluid-bath method. Whilst the basic method is identical, this test is primarily intended as a thermal shock test, not an immersion test. For equivalence, state the number of cycles, duration of immersion, and the nature and temperature of the two baths.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 104 is equivalent to IEC 68-2-14 Test Nc with the required bath temperatures, number of cycles, duration of immersion and test liquids added.

MIL-STD-202, TEST METHOD 105

BAROMETRIC PRESSURE

The barometric pressure test is performed under conditions simulating the low atmospheric pressure encountered in the non-pressurised portions of aircraft and other vehicles in high altitude flight.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 105 is equivalent to IEC 68-2-13, Test M.

MIL-STD-202, TEST METHOD 106

MOISTURE RESISTANCE

The purpose of the moisture resistance test is to evaluate, in an accelerated manner, the resistance of the device to the deteriorative effects of high humidity and heat conditions, typical of tropical environments, and cold.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 106 is equivalent to IEC 68-2-38, Test Z/AD.

MIL-STD-202, TEST METHOD 107

THERMAL SHOCK

The thermal shock test is performed to determine the resistance of a part to exposures at high and low temperatures, and to the shock of alternate exposures to these extremes. The test is performed in an air environment.

IEC 68-2-14, TEST Na
IEC 68-2-14, Test Na provides an equivalent to the MIL-STD. The lower and upper temperatures, selected from IEC specifications 68-2-1 and 68-2-2, are compatible with those given by the MIL-STD. The MIL-STD specifies a minimum exposure time at the temperature extremes, dependent on the weight of the sample. Within the IEC specification the exposure time is dependent on heat capacity.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 107 is equivalent to IEC 68-2-14, Test Na with the required temperature extremes, exposure time and number of cycles added.

MIL-STD-202, TEST METHOD 108

OPERATING LIFE

The operating life test is performed to determine the effects on the electrical and mechanical characteristics of a device to exposure to an elevated ambient temperature for a specified length of time.

CAPACITORS:
IEC 384-1, Section 3.24, endurance is a possible equivalent test. Although no test apparatus information is given, the essence of the test is the same as for the MIL-STD. Since critical parameters are given in the ESCC Generic and Detail Specifications, this test can meet the requirements of the MIL-STD test.

RESISTORS:
IEC 115-1, Section 4.25, endurance is a possible equivalent to the MIL-STD. Although no test apparatus information is given, the essence of the test is the same as for the MIL-STD. Since critical parameters are given in the ESCC Generic and Detail Specifications, this test can meet the requirements of the MIL-STD test.

OTHER (RF COILS, CONNECTORS):
No IEC equivalent test method was identified.

EQUIVALENCE STATUS
CAPACITORS: MIL-STD-202, Test Method 108 is equivalent to IEC 384-1, Section 4.23. Ensure that the test conditions are specified.

RESISTORS: MIL-STD-202, Test Method 108 is equivalent to IEC 115-1, Section 4.25. Ensure that the test conditions are specified.

RF COILS, CONNECTORS: No equivalent.

MIL-STD-202, TEST METHOD 112, CONDITION A

SEAL TEST

The seal test is required to determine the effectiveness of the seal of a component part which has an internal cavity which is either evacuated or contains air or gas.

MIL-STD-202, TEST METHOD 112, CONDITION A
Gross leak tests to determine leaks of a nominal value of 10^{-5}atm cm^3/s by the observation of bubbles. Condition A employs a mineral/peanut oil at +125 °C ±3 °C, and Condition B, silicone oil at +25 °C ±2 °C with a vacuum resulting in an absolute pressure of ≤ 38.1 Torr (50.8mbar). The specimen is immersed for a minimum of one minute whilst being observed for an indication of a poor seal, as evidenced by a continuous stream of bubbles.

IEC 68-2-17, TEST Qc, METHOD 2
IEC 68-2-17, Test Qc, Method 2 provides an equivalent test to the MIL-STD Condition A. The observation time is longer than the MIL-STD, specifying 10 minutes rather than the MIL-STD minimum of one minute. The IEC recommends a fluorocarbon as the test liquid.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 112, Condition A is equivalent to IEC 68-2-17 Test Qc Method 2, with absolute pressure and immersion time specified.

MIL-STD-202, TEST METHOD 112, CONDITION B

SEAL TEST

The seal test is required to determine the effectiveness of the seal of a component part which has an internal cavity which is either evacuated or contains air or gas.

MIL-STD-202, TEST METHOD 112, CONDITION B
Gross leak tests to determine leaks of a nominal value of 10^{-5}atm cm^3/s by the observation of bubbles. Condition A employs a mineral/peanut oil at +125 °C ±3 °C, and Condition B, silicone oil at +25 °C ±2 °C with a vacuum resulting in an absolute pressure of ≤ 38.1 Torr (50.8mbar). The specimen is immersed for a minimum of one minute whilst being observed for an indication of a poor seal, as evidenced by a continuous stream of bubbles.

IEC 68-2-17, TEST Qc, METHOD 1
IEC 68-2-17, Test Qc Method 1, provides an equivalent test to the MIL-STD Condition B. In the IEC test, the component is immersed in a liquid whose temperature is between +15 °C and +35 °C, and whose pressure is decreased to 10mbar and maintained for 1 minute for signs of component failure. This presents a more stringent requirement than the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 112, Condition B is equivalent to IEC 68-2-17 Test Qc Method 1, with absolute pressure and immersion time specified.

MIL-STD-202, TEST METHOD 112, CONDITION C, PROCEDURE IIIA

SEAL TEST

The seal test is required to determine the effectiveness of the seal of a component part which has an internal cavity which is either evacuated or contains air or gas.

MIL-STD-202, TEST METHOD 112, CONDITION C, PROCEDURE IIIa
A fine leak test, using a tracer gas (helium) to measure leakage rate to a nominal 10^{-8}atm cm^3/s. The method entails using a specified set of fixed conditions; pressure, pressure exposure time, and dwell time, to ensure the test sensitivity necessary to detect the required measured leak rate, R_1.

IEC 68-2-17 TEST Qk
IEC 68-2-17 Test Qk, Method 1, is an equivalent method to the MIL-STD, which, since the test conditions are stated within the ESCC Generic Specification, (duration of pressurisation, recovery time, reject rate) may be considered equivalent.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 112, Condition C, is equivalent to IEC 68-2-17, Test Qk, Method 1.

MIL-STD-202, TEST METHOD 204

VIBRATION, HIGH FREQUENCY

This test is performed to determine the effects of sinusoidal vibration on component parts in a specified frequency range.

IEC 68-2-6, TEST Fc, PROCEDURE B4
IEC 68-2-6, Test Fc, Procedure B4 provides an equivalent to the MIL-STD test. The IEC test provides the same frequency range as the MIL-STD. The vibration frequency is to vary exponentially between 10 and 2000Hz, with a sweep rate of 1 octave per minute. The frequency range specified encompasses 15.28 octaves, therefore a full frequency sweep will be traversed in 30.58 minutes. The number of frequency sweeps is specified as 10. The vibration peak amplitudes specified by the MIL-STD are available with the IEC test method.

Apart from the different sweep rates and the number of vibrations required for the tests, which could be standardised by specifying the required conditions, the methods are essentially the same. One of the differences that exists is in the method of frequency cycling. The MIL-STD method requires the vibration frequency to vary logarithmically between the frequency extremes whilst the IEC method requires the vibration frequency to vary exponentially. The use of an exponential as opposed to logarithmic variation in frequency by IEC appears to make very little difference in the shape of the change of frequency curve when frequency is plotted against time.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 204, is equivalent to IEC 68-2-6, Test Fc, with the required vibration peak amplitude added.

MIL-STD-202, TEST METHOD 208

SOLDERABILITY

The purpose of this test is to determine the solderability of all terminations that are normally joined by soldering process. The test includes accelerated aging, simulating 6 months natural aging.

IEC 68-2-20, TEST Ta
The IEC test, IEC 68-2-20, Test Ta, Method 1, provides the same test method as the MIL-STD. However, the MIL-STD is more specific in its description of flux coating the termination and in failure criteria.

The IEC method has two advantages over the MIL-STD. The solder is at a lower nominal temperature and the dwell time in the solder bath is shorter for low thermal capacity components. The test is therefore more stringent whilst causing less damage to the component. More detailed failure criteria, to the same level as the MIL-STD, could be added, for complete compatibility.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 208, is equivalent to IEC 68-2-20, Test Ta, Method 1.

MIL-STD-202, TEST METHOD 210

RESISTANCE TO SOLDERING HEAT

The resistance to soldering heat test is performed to determine whether component parts can withstand the effects of heat; to which they will be subjected during the soldering of their terminations by solder dip, soldering iron, or solder wave techniques.

IEC 68-2-20, TEST Tb
IEC 68-2-20 Test Tb, Method 1A or 1B, provides an equivalent test method to the MIL-STD, using the same temperature of solder bath and immersion time. The rates at which the termination enters and exits the solder bath are equivalent. More detail is included within the IEC method regarding the dimensions and volume of the required solder bath, but the MIL-STD is more specific in its description of flux coating the termination. The MIL-STD prohibits the use of heat sinks or shielding, except when it is part of the component, or as applicable in individual cases. The IEC test permits the use of a thermally insulating screen unless otherwise prescribed. These differences are not considered to be major, since test requirements/conditions peculiar to a generic type would be stated as applicable. IEC Method 1A or 1B is selected, depending on the required temperature and duration.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 210, is equivalent to IEC 68-2-20, Test Tb, Method 1A or 1B.

MIL-STD-202, TEST METHOD 211, CONDITION A

TERMINAL STRENGTH

The MIL-STD terminal strength tests are applied to ensure that the design of terminals and their method of attachment can withstand the mechanical stresses to which they will be subjected during installation, or disassembly, in equipment.

TENSILE (PULL) TEST
MIL-STD-202, Test Method 211, Condition A, Tension, ensures that the terminations and attachment of the terminations to the body of the component will withstand tensile stresses that are likely to be applied during normal assembly or handling operations.

IEC 68-2-21, TEST Ua_1
IEC 68-2-21, Test Ua_1, provides an equivalent to the MIL-STD. Forces are specified within the IEC specification, but are not required since the ESCC Detail Specification states the required applied force. The direction of the applied force and the test duration are the same as for the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 211, Condition A, is equivalent to IEC 68-2-21, Test Ua_1.

MIL-STD-202, TEST METHOD 211, CONDITION B

TERMINAL STRENGTH

The MIL-STD terminal strength tests are applied to ensure that the design of terminals and their method of attachment can withstand the mechanical stresses to which they will be subjected during installation, or disassembly, in equipment.

BEND TEST
MIL-STD-202, Test Method 211, Condition B, applicable to flat terminals is equivalent to IEC 68-2-21, Test Ub, Method 1.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 211, Condition B, is equivalent to IEC 68-2-21, Test Ub, Method 1.

MIL-STD-202, TEST METHOD 211, CONDITION C

TERMINAL STRENGTH

The MIL-STD terminal strength tests are applied to ensure that the design of terminals and their method of attachment can withstand the mechanical stresses to which they will be subjected during installation, or disassembly, in equipment.

BEND TEST
Condition C, applicable to wire leads, is equivalent to IEC 68-2-21, Test Ub, Method 2.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 211, Condition C, is equivalent to IEC 68-2-21, Test Ub, Method 2.

MIL-STD-202, TEST METHOD 211, CONDITION D

TERMINAL STRENGTH

The MIL-STD terminal strength tests are applied to ensure that the design of terminals and their method of attachment can withstand the mechanical stresses to which they will be subjected during installation, or disassembly, in equipment.

TORSION (TWIST) TEST
MIL-STD-202, Test Method 211, Condition D, Torsion, is required to ensure that the terminations and the attachment of the terminations to the body of the component will withstand torsional forces, such as may be applied during normal assembly or dismantling operations.

IEC 68-2-21, Test Uc, Method A, Severity 1, is an equivalent torsion test. Preparation of the termination and the test, including the rate of rotation, are identical to the requirements of the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 211, Condition D, is equivalent to IEC 68-2-21 Test Uc, Method A, Severity 1.

MIL-STD-202, TEST METHOD 213

MECHANICAL SHOCK

The mechanical shock test is intended to determine the ability of the devices to withstand severe shocks, such as those produced by rough handling, transportation or field operation.

IEC 68-2-27, TEST Ea
The IEC provides an equivalent test to the MIL-STD, with virtually identical ranges of test conditions. There are minor differences in the pulse shape tolerance levels (rate of acceleration and velocity change of the pulse) and the high frequency cut-off of the output filter, which is not considered to be detrimental. Guidance on the performance of the test, and measuring equipment, is given in both test methods, However additional information on interpretation of the results is given in the IEC specification.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 213 is equivalent to IEC 68-2-27, Test Ea.

MIL-STD-202, TEST METHOD 215

RESISTANCE TO SOLVENTS

The purpose of this test is to verify that markings or colour coding will not become illegible or discoloured when subjected to solvents, or that component coatings and encapsulant materials are not degraded to the point where mechanical integrity is disturbed.

ESCC BASIC SPECIFICATION No. 24800
The MIL-STD and ESCC methods are essentially the same. The difference in solvents is not considered to have a detrimental effect on the performance of the test.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 215 is equivalent to ESCC Basic Specification No. 24800, or the IEC 68-2-45, Test XA.

N.B.
Amendment 1, 1993, to Euronorme EN 60068-2-45 requires that whenever possible, Propan-1-01 (isopropyl alcohol) industrial grade is used instead of the hazardous 1,1,2 - trichlorotriofluoroethane.

MIL-STD-202, TEST METHOD 301

DIELECTRIC WITHSTANDING VOLTAGE

The dielectric withstanding voltage test is required to prove that the component can operate safely at its rated voltage, and withstand momentary overpotentials due to phenomena such as switching and surges. The test consists of the application of a voltage, higher than the rated voltage, for a specified time between mutually insulated portions of a component part or between insulated portions and ground.

CAPACITORS
IEC 384-1, Clause 4.6, Voltage Proof, specifies a test which has the same meaning and intent as the MIL- STD dielectric withstanding voltage test. Since the rate, and duration, of application of test conditions is given in the applicable specification, this test may be equivalent.

RF-COILS
No equivalent IEC test method was found for RF coils.

RELAYS (LATCHING/NON-LATCHING)
IEC 255-5, Clause 6, Dielectric Tests, specifies an equivalent to the MIL-STD. The voltage to be applied is specified within the IEC specification, but is not required since the ESCC Detail Specification states the required voltage.

SWITCHES
No equivalent IEC test method was identified for Switches.

RESISTORS (THICK FILM)
IEC 115-1, Section 4.7, Voltage Proof, specifies an equivalent to the MIL-STD dielectric withstanding voltage test. All of the test conditions are specified in the ESCC Generic Specification, except for the rate of application of the test voltage; the MIL-STD specifies a rate of 500V/s, and the IEC a rate of 100V/s.

THERMISTORS
IEC 115-1, Section 4.7, Voltage Proof, specifies an equivalent to the MIL-STD dielectric withstanding voltage test, since all of the test conditions are specified in the ESCC Generic Specification.

EQUIVALENCE STATUS
CAPACITORS
MIL-STD-202, Test Method 301, is equivalent to IEC 384-1, Section 4.6, with the rate and duration of application of the test conditions specified.

RESISTORS
MIL-STD-202, Test Method 301, is equivalent to IEC 115-1, Section 4.7, with the rate of application of test voltage specified.

THERMISTORS
MIL-STD-202, Test Method 301, is equivalent to IEC 115-1, Section 4.7.

RELAYS
MIL-STD-202, Test Method 301, is equivalent to IEC 255-5, Clause 6, with the test voltage specified.

RF COILS, SWITCHES No equivalent.

MIL-STD-202, TEST METHOD 302

INSULATION RESISTANCE

The insulation resistance test measures the resistance offered by the insulating members of a component part to a direct impressed voltage tending to produce a leakage of current through, or on the surface of, these members.

CAPACITORS
The MIL-STD-202, Test Method 302, and IEC 384-1, Section 4.5, requirements for the measurement of insulation resistance are equivalent. Test potential to be specified.

RF-COILS
No equivalent IEC test method was identified for RF Coils.

RELAYS (LATCHING/NON-LATCHING)
IEC 255-5, Clause 7, Measurements of Insulation Resistance, specifies an equivalent to the MIL-STD. The voltage to be applied is specified within the IEC specification, but is not required since the ESCC Detail Specification states the required voltage.

SWITCHES
No equivalent IEC test method was identified for Switches.

RESISTORS (THICK FILM)
The MIL-STD-202, Test Method 302, and IEC 115-1, Section 4.6, methods for the measurement of insulation resistance are essentially the same. The main difference is the time of application of the test potential, electrification time. The MIL-STD states that if the specified insulation resistance is reached before the end of the specified period and is found to be steady or increasing, then the test may be terminated before the end of the. test period. Since the MIL-STD test is applicable to components such as capacitors and cables, where the insulation resistance will take some time to reach its steady state value, it is considered that the IEC time of 1 minute is adequate for resistors. Electrification time should be specified.

THERMISTORS
As with the resistors, electrification time should be specified.

EQUIVALENCE STATUS
CAPACITORS
MIL-STD-202, Test Method 302, is equivalent to IEC 384-1, Section 4.5, with the required test potential stated.

RESISTORS
MIL-STD-202, Test Method 302, is equivalent to IEC 115-1, Section 4.6, with the required electrification time stated.

THERMISTORS
MIL-STD-202, Test Method 302, is equivalent to IEC 115-1, Section 4.6, with the required electrification time stated.

RELAYS
MIL-STD-202, Test Method 302, is equivalent to IEC 255-5, Clause 7, with the test voltage specified.

RF COILS, SWITCHES
No equivalent.

MIL-STD-202, TEST METHOD 303

DC RESISTANCE

RESISTORS (THICK FILM)
The IEC 115-1, Section 4.5 method for de resistance is essentially the same as the MIL-STD method. The only difference is the temperature at which the measurements are taken. The MIL-STD specifies measurements made at, or corrected to, +25 °C. The IEC specifies +20 °C.

RF-COILS
No equivalent IEC test method was identified for RF coils.

RELAYS (LATCHING/NON-LATCHING)
No IEC test method for the coil resistance of electromagnetic relays was identified.

EQUIVALENCE STATUS
RESISTORS
MIL-STD-202, Test Method 303, is equivalent to IEC 115-1, Section 4.5, with the addition of test temperature.

RF-COILS, RELAYS
No equivalent.

MIL-STD-202, TEST METHOD 305

CAPACITANCE

The purpose of this test is to measure the capacitance of component parts. Preferred test frequencies for this measurement are 60Hz, 120Hz, 1kHz, 100kHz and 1MHz.

EQUIVALENCE STATUS
IEC 384-1, Section 4.7, with the addition of the test temperature, provides an equivalent to the MIL-STD. Requirements for test frequencies and tolerances are already present in the ESCC Generic Specification.

MIL-STD-202, TEST METHOD 307

CONTACT RESISTANCE

The purpose of the contact resistance test is to determine the resistance offered to a flow of current during its passage between the electrical contacts of current controlling components such as switches.

RELAYS (LATCHING/NON-LATCHING)
No IEC test method for the measurement of the contact resistance of electromagnetic relays was identified.

SWITCHES
No IEC test method for contact resistance of toggle switches was identified.

EQUIVALENCE STATUS
No equivalent.

MIL-STD-202, TEST METHOD 308

CURRENT-NOISE TEST FOR FIXED RESISTORS

This resistor noise test method is performed for the purpose of establishing the "noisiness" or "noise quality" of a resistor in order to determine its suitability for use in electronic circuits having critical noise requirements.

IEC 195
The IEC test, IEC 195, provides the same test method as the MIL-STD and is considered equivalent.

EQUIVALENCE STATUS
MIL-STD-202, Test Method 308, is equivalent to IEC 195.

MIL-STD-202, TEST METHOD 310

CONTACT CHATTER

The contact chatter test, carried out on electrical components having movable parts, is performed in conjunction with either a mechanical shock test or vibration scan.

EQUIVALENCE STATUS
No equivalent.

MIL-STD-202, TEST METHOD 311

LIFE TESTING, LOW LEVEL SWITCHING

This test is performed to determine the electrical contact reliability under low level switching conditions in the environment in which the contacts operate.

Test conditions are described within the ESCC Generic and Detail Specifications. No equivalent IEC specification for low level test was identified.

EQUIVALENCE STATUS
No equivalent.

MIL-STD-202, TEST METHOD 312

INTERMEDIATE CURRENT SWITCHING

The intermediate current switching test is performed to determine the electrical contact reliability of relays under intermediate current switching conditions. Test conditions and the measurements required are specified in the ESCC Generic and Detail Specifications.

No equivalent IEC specification for low level test was identified.

EQUIVALENCE STATUS
No equivalent.

SPECIFICATION CROSS REFERENCE - SUMMARY: MIL-STD-750, IEC AND OTHER TEST METHODS

IEC and Other Test Methods	MIL-STD-750 Test Methods																									No Identified Equivalent
	1021	1026	1031	1032	1038	1039	1040	1056	1071	2006	2016	2017	2026	2036	2037	2052	2056	2072	2073	2074	2076	2077	3051	3052	3053	3474	
IEC 747-1		E	E*	E*	E*	E*	E*																				
IEC 749												E			E		E*										
IEC 68-2-6																	E*										
IEC 68-2-7										E*																	
IEC 68-2-14								E																			
IEC 68-2-17									E*																		
IEC 68-2-20													E														
IEC 68-2-21														E*													
IEC 68-2-27											E																
IEC 68-2-38	E																										
ESCC 20400																		E*	E*	E*							
ESCC 20500																											N
ESCC 20600																											N
ESCC 20900																					E						
ESCC 21400																						E*					
No Identified Equivalent																N							N	N	N	N	

NOTES

E = Equivalent.

N = No identified equivalent.

* = Refer to comparison tables for further detail on equivalence status.

MIL-STD-750, TEST METHOD 1021

MOISTURE RESISTANCE

The purpose of the moisture resistance test is to evaluate, in an accelerated manner, the resistance of the device to the deteriorative effects of the high humidity and heat conditions typical of tropical environments.

IEC 68-2-38, TEST Z/AD

IEC 68-2-28, Test Z/AD, composite temperature/humidity cyclic test, is equivalent to the MIL-STD moisture resistance test.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 1021 (referencing MIL-STD-202, Test Method 106), is equivalent to IEC 68-2-38, Test Z/AD.

MIL-STD-750, TEST METHOD 1026

OPERATING LIFE

The operating life is determined:

- During Qualification Testing, where the test duration is 2000 hours, with measurements at intermediate and end points at 0, 1000 ±48 hours and 2000 ±48 hours. Test conditions are given in the applicable ESCC Detail Specification.
- During Lot Acceptance Testing, where the test duration is 1000 hours, with measurements at 0 hours and 1000 ±48 hours. Test conditions are given in the applicable ESCC Detail Specification.

IEC 747-1, CHAPTER VIII, SECTION 3, ELECTRICAL ENDURANCE TESTS

The general specification for discrete devices, IEC 747-1, describes an electrical endurance test, operated under steady state conditions which, since the main body of information required for the operating life test is contained within the ESCC Detail Specification, may be considered equivalent to the MIL-STD.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 1026, is equivalent to IEC 747-1, Chapter VIII, Section 3, Electrical Endurance Tests.

MIL-STD-750, TEST METHOD 1031

HIGH TEMPERATURE LIFE

IEC 68-2-2, TEST Ba

A possible IEC equivalent to MIL-STD-750, Method 1031, is IEC 68-2-2, dry heat, Test Ba, dry heat for a non-heat-dissipating specimen with a sudden change of temperature.The specimen is removed from ambient temperature to a chamber at high temperature for a specified duration. The greatest duration for this test was given as 96 hours, but the test could be reviewed to extend the time in accordance with the requirements of the applicable ESCC Generic Specification.

IEC 747-1, CHAPTER VIII, SECTION 3

This test gives greater equivalence to the MIL-STD. Test duration conforms to the MIL-STD requirements and the test conditions, and measurements to be performed, are given in the ESCC Detail and Generic Specifications.

RECOMMENDATION

MIL-STD-750, Test Method 1031, is equivalent to IEC 747-1, Chapter VIII, Section 3. Ensure that test conditions are stated.

MIL-STD-750, TEST METHOD 1032

HIGH TEMPERATURE LIFE

IEC 68-2-2, TEST Ba

A possible IEC equivalent to MIL-STD-750, Method 1032, is IEC 68-2-2, Dry Heat, Test Ba, dry heat for a non-heat-dissipating specimen with a sudden change of temperature.The specimen is removed from ambient temperature to a chamber at high temperature for a specified duration. The greatest duration for this test was given as 96 hours, however the test could be reviewed to extend the time in accordance with the requirements of the applicable ESCC Generic Specification.

IEC 747-1, CHAPTER VIII, SECTION 3.

This test gives greater equivalence to the MIL-STD. Test duration conforms to the MIL-STD requirements and the test conditions and measurements to be performed are given in the ESCC Detail and Generic Specifications.

RECOMMENDATION

MIL-STD-750, Test Method 1032, is equivalent to IEC 747-1, Chapter VIII, Section 3. Ensure test conditions and measurements are stated.

MIL-STD-750, TEST METHOD 1038

BURN-IN (DIODES & RECTIFIERS)

The burn-in test is performed to eliminate marginal devices or those with defects resulting from manufacturing aberrations that are evidenced as time and stress dependent. The device is operated at specified conditions to reveal electrical failure modes that are time and stress dependent.

IEC 747-1, CHAPTER VIII, SECTION 3

The MIL-STD test requirements concerning the burn-in tests for diodes, rectifiers, and transistors can be encompassed by the IEC 747-1 Electrical Endurance Tests. The IEC test can meet the requirements of the MIL-STD by applying the conditions stated within the appropriate ESCC Generic and Detail Specifications.

RECOMMENDATION

MIL-STD-750, Test Method 1038, is equivalent to IEC 747-1, Chapter VIII, Section 3. Ensure that the test conditions are stated.

MIL-STD-750, TEST METHOD 1039

BURN-IN (TRANSISTORS)

The burn-in test is performed to eliminate marginal devices or those with defects resulting from manufacturing aberrations that are evidenced as time and stress dependent. The device is operated at specified conditions to reveal electrical failure modes that are time and stress dependent.

IEC 747-1, CHAPTER VIII, SECTION 3

The MIL-STD test requirements concerning the burn-in tests for diodes, rectifiers, and transistors can be encompassed by the IEC 747-1 Electrical Endurance Tests. The IEC test can meet the requirements of the MIL-STD by applying the conditions stated within the appropriate ESCC Generic and Detail Specifications.

RECOMMENDATION

MIL-STD-750, Test Method 1039, is equivalent to IEC 747-1, Chapter VIII, Section 3. Ensure that the test conditions are stated.

MIL-STD-750, TEST METHOD 1040

BURN-IN (THYRISTORS)

The burn-in test is performed to eliminate marginal devices or those with defects resulting from manufacturing aberrations that are evidenced as time and stress dependent. The device is operated at specified conditions to reveal electrical failure modes that are time and stress dependent.

IEC 747-1, CHAPTER VIII, SECTION 3

The MIL-STD test requirements concerning the burn-in tests for diodes, rectifiers, and transistors can be encompassed by the IEC 747-1 Electrical Endurance Tests. The IEC test can meet the requirements of the MIL-STD by applying the conditions stated within the appropriate ESCC Generic and Detail Specifications.

RECOMMENDATION

MIL-STD-750, Test Method 1040, is equivalent to IEC 747-1, Chapter VIII, Section 3. Ensure that the test conditions are stated.

MIL-STD-750, TEST METHOD 1056, CONDITION A

THERMAL SHOCK (GLASS STRAIN)

The thermal shock test is performed to determine the resistance of a part to exposures at high and low temperatures, and to the shock of alternate exposures to these extremes. The two fluid bath method results in a severe thermal shock, and is applicable to glass-metal seals and similar specimens.

IEC 68-2-14, TEST Nc

IEC 68-2-14, Test Nc, provides an equivalent to the MIL-STD, Condition A. There is a difference in the minimum time specified for the sample to remain in the cold liquid. This difference is not considered to be significant.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 1056, is equivalent to IEC 68-2-14, Test Nc.

MIL-STD-750, TEST METHOD 1071, CONDITION C

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities. Two seal tests are carried out, a fine leak test followed by a gross leak test, to determine the presence of leaks of different magnitudes.

IEC 68-2-17, TEST Qc

IEC 68-2-17, Test Qc, Test Method 3 (Gross Leak), provides an equivalent to MIL-STD-750, Test Method 1071, Condition C. The main area of difference is the applied pressure. During the initial pressurisation the IEC specifies a pressure of 1mbar, as opposed to 0.65mbar from the MIL-STD. After the indicator fluid has been added the MIL-STD requires pressurisation of 414kPa for 2 hours minimum, whilst the IEC requires 300kPa.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 1071, Condition C, is equivalent to IEC 68-2-17, Test Qc, with the required test pressures stated.

MIL-STD-750, TEST METHOD 1071, CONDITION H1

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities. Two seal tests are carried out, a fine leak test followed by a gross leak test, to determine the presence of leaks of different magnitudes.

IEC 68-2-17, TEST Qk

IEC 68-2-17, Test Qk (Fine Leak), provides an equivalent test method to the MIL-STD "fixed" method. There is a difference in the dwell time, which in the case of the MIL-STD is 60 minutes (max) but for IEC is only 30 minutes (max). Time under pressure and the reject limit shall be stated.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 1071, Condition H1, is equivalent to the IEC 68-2-17, Test Qk, with exposure time, bomb pressure, reject limit and dwell time (for the flexible method) stated.

MIL-STD-750, TEST METHOD 1071, CONDITION H2

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities. Two seal tests are carried out, a fine leak test followed by a gross leak test, to determine the presence of leaks of different magnitudes.

IEC 68-2-17, TEST Qk

IEC 68-2-17, Test Qk, provides an equivalent test method to the MIL-STD "flexible" method for fine leak detection.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 1071, Condition H2, is equivalent to the IEC 68-2-17, Test Qk, with exposure time, bomb pressure, reject limit and dwell time (for the flexible method) stated.

MIL-STD-750, TEST METHOD 2006

CONSTANT ACCELERATION

Constant acceleration is used to determine the effects of a centripetal force on devices; thus indicating types of structural and mechanical weaknesses not necessarily detected in shock/vibration tests.

IEC 68-2-7, TEST Ga

The MIL-STD and IEC test methods for constant acceleration are essentially the same. The IEC does not state the rate of acceleration from zero to the test rate, and vice-versa. Test conditions are given in the ESCC Generic Specification.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2006, is equivalent to the IEC 68-2-7, Test Ga, with the required acceleration/deceleration rates stated.

MIL-STD-750, TEST METHOD 2016

SHOCK

The shock test is intended to determine the ability of the devices to withstand severe shocks, such as those produced by rough handling, transportation or field operation.

IEC 68-2-27, TEST Ea

The ESCC Generic Specification states the required peak acceleration, duration and number of shocks. The MIL-STD and IEC test methods for the shock test are essentially the same. The duration of the applied shock is slightly longer within the IEC test, but not to a significant extent. There is a slight discrepancy in the upper frequency of the measurement transducer. This is not considered to be significant.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2016, is equivalent to the IEC 68-2-27, Test Ea.

MIL-STD-750, TEST METHOD 2017

DIE SHEAR TEST

The purpose of the die shear strength test is to establish the integrity of the semiconductor die attachment to the package header or other substrate.

IEC 749, DIE SHEAR STRENGTH TEST

IEC 749 provides an equivalent to the MIL-STD. The IEC test does not include the X1.5 failure criteria and additionally is not applicable for die areas greater than $10mm^2$.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2017, is equivalent to IEC 749, Die Shear Strength Test.

MIL-STD-750, TEST METHOD 2026

SOLDERABILITY

The purpose of this test is to determine the solderability of wires up to a specified thickness, as well as all other lugs, tabs etc. The test includes accelerated aging to simulate six months natural aging.

IEC 68-2-20, TEST Ta, METHOD 1

IEC 68-2-20, Test Ta, Method 1, provides an equivalent to the MIL-STD. The IEC method specifies a lower nominal solder temperature and shorter dwell time in the solder bath. The test is therefore more stringent whilst causing less damage to the component. The MIL-STD is more specific in its failure criteria.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2026, is equivalent to the IEC 68-2-20, Test Ta, Method 1.

MIL-STD-750, TEST METHOD 2036, CONDITION A (TENSION)

TERMINAL STRENGTH TESTS

The terminal strength tests are required to check the capabilities of the device leads, welds and seals to withstand a straight pull.

IEC 68-2-21, TEST Ua_1

IEC 68-2-21, Test Ua_1, provides an equivalent to the MIL-STD. The IEC test specifies applied force and test duration, however these are not required since the applicable ESCC Detail Specification states test conditions.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2036, Condition A, is equivalent to IEC 68-2-21, Test Ua_1.

MIL-STD-750, TEST METHOD 2036, CONDITION D1 (LEAD OR TERMINAL TORQUE)

TERMINAL STRENGTH TESTS

This test is designed to check device leads and seals for their resistance to twisting motions.

IEC 68-2-21, TEST Uc

IEC 68-2-21, Test Uc, Method A, is the nearest equivalent to the MIL-STD. The method by which the IEC applies the torque, bending the lead through 90°, clamping the lead, then rotating, is covered by the MIL-STD statement: "... or other suitable method of applying the specified torque without lead restriction". The torque and test duration are given in the ESCC Detail Specification. Thus the IEC test may be considered equivalent.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2036, Condition D1, is equivalent to IEC 68-2-21, Test Uc.

MIL-STD-750, TEST METHOD 2036, CONDITION D2 (STUD TORQUE)

TERMINAL STRENGTH TESTS

This check is designed to check the resistance of devices with threaded mounting studs to the stress caused by tightening the devices when mounting.

IEC 68-2-21, TEST Ud

IEC 68-2-21, Test Ud, provides an equivalent to the MIL-STD. The IEC test specifies applied force and duration conditions, however these are not required since the applicable ESCC Detail Specification states test conditions.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2036, Condition D2, is equivalent to IEC 68-2-21, Test Ud.

MIL-STD-750, TEST METHOD 2036, CONDITION E (LEAD FATIGUE)

TERMINAL STRENGTH TESTS

This test is to check the resistance of the device leads to metal fatigue.

IEC 68-2-21, TEST Ub

IEC 68-2-21, Test Ub, provides an equivalent to the MIL-STD. The number of bends required should be specified. Failure criteria are given in IEC 749.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2036, Condition E, is equivalent to IEC 68-2-21, Test Ub, with the required number of bends added.

MIL-STD-750, TEST METHOD 2037, CONDITION A

BOND STRENGTH

The purpose of this test is to measure bond strengths or to determine compliance with the specified bond strength requirements. Two test conditions are available, A and B, for a wire pull as applied to a double bond and to a single bond, respectively.

IEC-749, SECTION 6, BOND STRENGTH TEST, CONDITION B

IEC-749, Section 6, Bond Strength Test, Condition B, provides an equivalent to the MIL-STD. The failure criteria, including the minimum bond strengths, are virtually identical, assuming g to be $10m/s^2$. The MIL-STD method allows for a wider range of wire diameters, up to 0.5mm.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2037, Condition A, is equivalent to IEC-749, Chapter 2, Section 6, Test Condition B.

MIL-STD-750, TEST METHOD 2037, CONDITION B

BOND STRENGTH

The purpose of this test is to measure bond strengths or to determine compliance with the specified bond strength requirements. Two test conditions are available, A and B, for a wire pull as applied to a double bond and to a single bond, respectively.

IEC-749, SECTION 6, BOND STRENGTH TEST, TEST CONDITION A

IEC-749, Section 6, Bond Strength Test, Test Condition A, provides an equivalent to the MIL-STD. However, there is a difference in the angle at which the force must be applied in the case of a stitch bond, which may require further review.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2037, Condition B, is equivalent to IEC-749, Chapter 2, Section 6, Test Condition A.

MIL-STD-750, TEST METHOD 2052, CONDITION B

PARTICLE IMPACT NOISE DETECTION

The particle impact noise detection test is required to detect loose particles inside a device cavity. The test identifies those devices which contain particles of sufficient mass that, upon impact with the case, excite a transducer. MIL-STD-750, Test Method 2052, using Condition B: 10g peak at 60Hz, is specified as the required test method.

No IEC equivalent was identified for this test.

EQUIVALENCE STATUS

No equivalent.

MIL-STD-750, TEST METHOD 2056

VIBRATION, VARIABLE FREQUENCY

The vibration test is performed to determine the effect on the device of vibration in a specified frequency range.

IEC 68-2-6, TEST Fc & IEC 749

IEC 68-2-6, Test Fc, provides an equivalent to the MIL-STD test, with specific guidance for semiconductor devices in IEC 749. An area of difference between the two specifications is the number of cycles of the frequency range required by each test spec. The MIL-STD requirement is for the frequency range, 100Hz to 2000Hz, to be cycled 4 times in 3 mutually perpendicular axes, whilst the IEC requires 15 cycles in each axis.The MIL-STD requires the entire frequency range (100 to 2000 to 100Hz) to be traversed in 4 minutes. The IEC specifies a sweep rate of 1 octave per minute, in which case a full frequency sweep would take ≈17 minutes; significantly longer than the MIL-STD.

NOTE: The ESCC Generic Specifications that refer to this MIL-STD test specify a frequency range of 10Hz to 2000Hz.

The MIL-STD method requires the vibration frequency to vary logarithmically between the frequency extremes whilst the IEC method requires the vibration frequency to vary exponentially. The use of an exponential as opposed to logarithmic variation in frequency by IEC makes little difference to the shape of the change of frequency curve.

EQUIVALENCE STATUS

MIL-STD-750, Test Method 2056, is equivalent to IEC 68-2-6, Test Fc, and IEC 749, with the required frequency range, peak acceleration, the number of sweep cycles in each axis and the sweep rate specified.

MIL-STD-750, TEST METHOD 3051

SAFE OPERATING AREA (CONTINUOUS DC)

The purpose of this test is to verify the boundary of SOA of a transistor as constituted by the interdependency of the specified voltage, current, power and temperature in a temperature stable circuit.

EQUIVALENCE STATUS

No equivalent.

MIL-STD-750, TEST METHOD 3052

SAFE OPERATING AREA (PULSED)

The purpose of this test is to verify the capability of a transistor to withstand pulses of specific voltage, current and time, establishing an SOA.

EQUIVALENCE STATUS

No equivalent.

MIL-STD-750, TEST METHOD 3053

SAFE OPERATING AREA (SWITCHING)

The purpose of this test is to verify the capability of a transistor to withstand switching between saturation and cut-off for various specified loads, establishing an SOA.

EQUIVALENCE STATUS
No equivalent.

MIL-STD-750, TEST METHOD 3474

SAFE OPERATING AREA FOR POWER MOSFETS OR INSULATED GATE BIPOLAR TRANSISTORS

The purpose of this test is to verify the boundary of the SOA as constituted by the interdependency of the specified voltage, current, power and temperature in a temperature stable circuit.

EQUIVALENCE STATUS
No equivalent.

SPECIFICATION CROSS REFERENCE – SUMMARY: MIL-STD-883, IEC AND OTHER TEST METHODS

IEC and Other Test Methods	MIL-STD-883 Test Methods																					No Identified Equivalent
	1004	1005	1008	1010	1011	1014	1015	1019	2001	2002	2003	2004	2007	2009	2010	2011	2012	2015	2018	2019	2020	
IEC 747-1		E*																				
IEC 748-1							E*															
IEC 749			E*			E*										E*						
IEC 68-2-6													E*									
IEC 68-2-7									E*													
IEC 68-2-14				E*	E*																	
IEC 68-2-17						E*																N*
IEC 68-2-20											E											
IEC 68-2-21												E*										
IEC 68-2-27										E*												
IEC 68-2-38	E																					
ESCC 20400															E*							
ESCC 20500														E								
ESCC 20900																	E					
ESCC 21400																			E			
ESCC 22900								E*														
ESCC 24800																		E				
CECC 90000 Test Method															E*							
No Identified Equivalent												N*								N	N	

NOTES
E = Equivalent.
N = No identified equivalent.
* = Refer to comparison tables for further detail on equivalence status.

MIL-STD-883, TEST METHOD 1004

MOISTURE RESISTANCE

The purpose of the Moisture Resistance test is to evaluate, in an accelerated manner, the resistance of the device to the deteriorative effects of the high humidity and heat conditions, typical of tropical environments.

IEC 68-2-38, TEST Z/AD

IEC 68-2-38, Test Z/AD, composite temperature/humidity cyclic test, is equivalent to the MIL-STD moisture resistance test.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1004, is equivalent to IEC 68-2-38, Test Z/AD.

MIL-STD-883, TEST METHOD 1005

OPERATING LIFE

Steady state life is required to demonstrate the quality or reliability of devices subjected to specified conditions, and is determined:

- During Qualification testing, where the test duration is 2000 hours, with measurements at 0, 1000 ±48 hours and 2000 ±48 hours. Test conditions are given in the appropriate ESCC Detail Specification.
- During Lot Acceptance Testing, where the test duration is 1000 hours, with measurements at 0 hours and 1000 ±48 hours. Test conditions are given in the appropriate ESCC Detail Specification.

IEC 747-1, CHAPTER VIII, SECTION 3, ELECTRICAL ENDURANCE TESTS

The general specification for discrete devices and integrated circuits, IEC 747-1, describes an electrical endurance test, operated under steady state conditions. The tests are of the same intent, however the MIL-STD is much more specific in its conditions and requirements. Since the main body of information required for the operating life test is contained within the ESCC Detail Specification, this test can be considered equivalent to the MIL-STD.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1005, is equivalent to IEC 747-1, Chapter VIII, Section 3, Electrical Endurance Tests. Ensure that the test conditions are specified.

MIL-STD-883, TEST METHOD 1008

HIGH TEMPERATURE STABILISATION BAKE

The stabilisation bake is required to determine the effect on microelectronic devices of storage at elevated temperatures without electrical stress being applied.

IEC 68-2-2, TEST Ba

An IEC equivalent to MIL-STD-883, Method 1008, is 68-2-2, Dry Heat, Test Ba, dry heat for a non-heat-dissipating specimen with sudden change of temperature. This specification is written in such a way that it could be interpreted/tailored to meet the requirements of the MIL-STD test, with the test conditions specified in the ESCC Generic Specification.

IEC 749, IEC 68-2-48

IEC 749, Chapter Ill, Section 2, using the guidance notes from IEC 68-2-48, provides an equivalent to MIL-STD-883, Method 1008.

RECOMMENDATION

MIL-STD-883, Test Method 1008 is equivalent to IEC 749, Chapter Ill, Section 2. Ensure test conditions and measurements are specified.

MIL-STD-883, TEST METHOD 1010

TEMPERATURE CYCLING

Temperature cycling is performed to determine the resistance of a part to exposures at high and low temperatures, and to the effect of alternate exposures to these extremes.

IEC 68-2-14, TEST Na

IEC 68-2-14, Test Na, provides an equivalent to the MIL-STD. Equivalent temperatures are specified in each test. The IEC test specifies 5 cycles, whereas the MIL-STD requires 10. The MIL-STD requirement for transition time between the temperature extremes is less than 1 minute. The IEC allows up to 2 minutes.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1010, is equivalent to IEC 68-2-14, Test Na, with the number of cycles, temperature extremes, exposure duration and transition time stated.

MIL-STD-883, TEST METHOD 1011

THERMAL SHOCK

The thermal shock test is performed to determine the resistance of a part to sudden exposures at high and low temperatures, and to the shock of alternate exposures to these extremes. The two fluid bath method results in a severe thermal shock, and is applicable to glass-metal seals and similar specimens.

IEC 68-2-14, TEST Nc

IEC 68-2-14, Test Nc, provides an equivalent to the MIL-STD. Equivalent temperatures are specified in each test. The IEC test specifies 10 cycles, whilst the MIL-STD requires 15.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1011, is equivalent to IEC 68-2-14, Test Nc, with the required temperature extremes, transfer period, number of cycles and test liquid specified.

MIL-STD-883, TEST METHOD 1014, CONDITION A1

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities.

IEC 68-2-17, TEST Qk

IEC 68-2-17, Test Qk (Fine Leak), provides an equivalent test method to the MIL-STD "fixed" method. There is a difference in the dwell time, which in the case of the MIL-STD is 60 minutes (max) but for IEC is only 30 minutes (max). Time under pressure and the reject limit should be specified.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1014, condition A1, is equivalent to IEC 68-2-17, Test Qk, with the exposure time and reject rate added.

MIL-STD-883, TEST METHOD 1014, CONDITION A2

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities.

IEC 68-2-17, TEST Qk

IEC 68-2-17, Test Qk (Fine Leak), provides an equivalent test method to the MIL-STD "flexible" method for fine leak detection.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1014, Condition A2, is equivalent to IEC 68-2-17, Test Qk, with the exposure time, bomb pressure, reject limit and dwell time added.

MIL-STD-883, TEST METHOD 1014, CONDITION A4

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities.

The MIL-STD Condition A4 detects the leak rate of an unsealed package. In use the package is mounted onto a bulkhead such that it becomes sealed. For test purposes the package is sealed, temporarily, by a dummy bulkhead.

IEC 68-2-17, TEST Qk

IEC 68-2-17, Test Qk (Fine Leak), Test Method 3, provides an equivalent test method.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1014, Condition A4, is equivalent to IEC 68-2-17, Test Qk, Test Method 3, with the test severities added.

MIL-STD-883, TEST METHOD 1014, CONDITION B

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities.

IEC 749, SECTION 7.3

IEC 749, Section 7.3, provides an equivalent radioisotope fine leak test. The procedures for this test are essentially the same. In preparation of the test, the MIL-STD requires the counting efficiency of the scintillating crystal to be determined using 5 representative samples of the device type. The IEC uses a sample of 1 device. The MIL-STD specifies 3 minutes, maximum for the evacuation of the krypton 85/dry nitrogen gas mixture from the activation tank, with leak testing performed within 1 hour of gas exposure. This time is 5 minutes maximum for the IEC test with leak testing performed within 2 hours of gas exposure. This identifies the MIL-STD as the more stringent test.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1014, Condition B, is equivalent to IEC 749, Section 7.3, with the evacuation time and maximum dwell time added.

MIL-STD-883, TEST METHOD 1014, CONDITION C1

SEAL TEST

The seal test is designed to determine the effectiveness of the seal of semiconductor devices with internal cavities.

IEC 68-2-17, TEST Qc

IEC 68-2-17, Test Qc, Method 3, provides an equivalent to MIL-STD-883, Method 1014, Condition C1. The MIL-STD requires a slightly higher pressure to be applied during conditioning than the IEC, but for a shorter duration. The required test pressure and duration should be specified.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1014, Condition C1, is equivalent to IEC 68-2-17, Test Qc, Method 3, with the test pressure and duration added.

MIL-STD-883, TEST METHOD 1015

BURN-IN TEST

Burn-in is performed to screen, or eliminate, marginal devices, those with inherent defects, or those with defects resulting from manufacturing aberrations which cause time and stress dependent failures. The device is operated at, or above, maximum operating conditions to identify, and eliminate, failure modes.

IEC 748-1

IEC 748-1, Chapter VIII, Section 3, Electrical Endurance Tests, provides a test procedure which could be interpreted as having the same meaning and intent as the MIL-STD. The MIL-STD is much more specific in its conditions and requirements.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 1015, is equivalent to IEC 748-1, Chapter VIII, Section 3, with test conditions specified.

MIL-STD-883, TEST METHOD 2001, CONDITION E
CONSTANT ACCELERATION

This test is required to determine the effects of a constant acceleration on micro-electronic devices. It is intended to reveal types of structural and mechanical weaknesses not necessarily detected in shock and vibration tests.

IEC 68-2-7, TEST Ga, ACCELERATION
IEC 68-2-7, Test Ga, provides an equivalent test to the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2001, Condition E, is equivalent to IEC 68-2-7, Test Ga, Test Condition 30000g, with the duration of the acceleration in each axis specified.

MIL-STD-883, TEST METHOD 2002
SHOCK

The shock test is intended to determine the ability of the devices to withstand severe shocks, such as those produced by rough handling, transportation, or field operation.

IEC 68-2-27, TEST Ea
IEC 68-2-27, Test Ea, provides an equivalent to the MIL-STD. The IEC method specifies 3 shock pulses whilst the MIL-STD requires 5.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2002, is equivalent to IEC 68-2-27, Test Ea, with the required number of shock pulses added.

MIL-STD-883, TEST METHOD 2003
SOLDERABILITY

The purpose of this test is to determine the solderability of wires up to a specified thickness. Solderability is defined as the ability of components to be wetted by solder, or to form a suitable fillet when dip soldered.

IEC 68-2-20, TEST Ta
IEC 68-2-20, Test Ta, provides an equivalent to the MIL-STD. The MIL-STD is more specific in the description of failure criteria. There is a small difference in the temperature of the solder baths, but this is not considered to have a significant effect.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2003, is equivalent to the IEC 68-2-20, Test Ta.

MIL-STD-883, TEST METHOD 2004, CONDITION B2
TERMINAL STRENGTH

This test is required to determine the integrity of micro-electronic device terminals, welds and seals.

The MIL-STD lead integrity test condition B2, as applied to all packages, requires the application of bending stresses to determine the integrity of leads, seals and lead plating, and the resistance of the leads to metal fatigue under repeated bending actions.

IEC 68-2-21, TEST Ub
IEC 68-2-21, Test Ub, provides an equivalent test to the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2004, Condition B2, is equivalent to the IEC 68-2-21, Test Ub, with the required number of bends added.

MIL-STD-883, TEST METHOD 2004, CONDITION D
TERMINAL STRENGTH

This test is required to determine the integrity of micro-electronic device terminals, welds and seals.

EQUIVALENCE STATUS
No equivalent for Condition D.

MIL-STD-883, TEST METHOD 2007
VIBRATION

This test is performed to determine the effects of vibration in the specified frequency range.

IEC 68-2-6, TEST Fc
IEC 68-2-6, Test Fc, provides an equivalent test to the MIL-STD. The MIL-STD method requires the vibration frequency to vary logarithmically between 20 and 2000 Hz in ≥ 4 minutes. The IEC method requires the vibration frequency to vary exponentially between 10 and 2000 Hz, with a sweep rate of 1 octave per minute. The frequency range spans ≈15 octaves, therefore a full frequency sweep will take significantly longer than the MIL-STD.

The use of an exponential as opposed to logarithmic variation in frequency by IEC is of little relevance, since the shape of the rate of change of frequencies is the same for both.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2007, is equivalent to IEC 68-2-6, Test Fc, with the frequency range, sweep rate, number of cycles per axis and vibration amplitude added.

MIL-STD-883, TEST METHOD 2009
EXTERNAL VISUAL INSPECTION

The purpose of this test method is to verify the workmanship of hermetically packaged devices. The test method shall also be utilised to inspect for damage due to handling, assembly and/or test of the packaged device.

ESCC 20500
ESCC 20500, supported by ESCC 2059000, External Visual Inspection of Integrated Circuits, provides a near equivalent to the MIL-STD since it is based on both documents.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2009, is equivalent to ESCC 20500/2059000.

MIL-STD-883, TEST METHOD 2010
INTERNAL VISUAL INSPECTION

This test is performed to detect and eliminate devices with internal defects that could lead to device failure in normal applications.

CECC 90000

CECC 90000, Addendum 1, Internal Visual Inspection, provides a near equivalent since it is based on a version of the MIL-STD (which has now been revised).

ESCC 20400

ESCC 20400, supported by ESCC 2049000, Internal Visual Inspection of Integrated Circuits, provides a near equivalent to the MIL-STD since it is based on both documents.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 2010, is equivalent to CECC 90000, Addendum 1.

MIL-STD-883, Test Method 2010, is equivalent to ESCC 20400/2049000.

MIL-STD-883, TEST METHOD 2011, CONDITION C
BOND STRENGTH TEST

This test is required to measure bond strengths to determine compliance with the applicable specification.

IEC-749, SECTION 6, BOND STRENGTH, METHOD A

IEC-749, Section 6 Bond Strength, Method A, provides an equivalent to the MIL-STD. The description of the tests, given by MIL-STD and IEC, are identical. The IEC includes a clause for the case of a stitch bond. The failure criteria, including the minimum bond strengths, are identical.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 2011, Condition C, is equivalent to the IEC-749, Section 6, Bond Strength, Method A.

MIL-STD-883, TEST METHOD 2011, CONDITION D
BOND STRENGTH TEST

This test is required to measure bond strengths to determine compliance with the applicable specification.

IEC-749, SECTION 6, BOND STRENGTH, METHOD B

IEC-749, Section 6, Bond Strength, Method B, provides an equivalent to the MIL-STD. The failure criteria, including the minimum bond strengths, are identical, assuming g to be $10m/s^2$. Also included in the MIL-STD is a graph of the minimum bond pull limit against wire diameter; to be referred to in cases where non-specified wire diameters are used.

EQUIVALENCE STATUS

MIL-STD-883, Test Method 2011, Condition D, is equivalent to the IEC-749, Section 6, Bond Strength, Method B.

MIL-STD-883, TEST METHOD 2011, CONDITION F

BOND STRENGTH TEST

This test is required to measure bond strengths to determine compliance with the applicable specification.

IEC-749, SECTION 6, BOND STRENGTH, METHOD D
IEC-749, Section 6, Bond Strength, Method D, provides an equivalent to the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2011, Condition F, is equivalent to the IEC-749, Section 6, Bond Strength, Method D.

MIL-STD-883, TEST METHOD 2011, CONDITION G

BOND STRENGTH TEST

This test is required to measure bond strengths to determine compliance with the applicable specification.

IEC-749, SECTION 6, BOND STRENGTH, METHOD E
IEC-749, Section 6, Bond Strength, Method E, provides an equivalent to the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2011, Condition G, is equivalent to the IEC-749, Section 6, Bond Strength, Method E, with the force to be applied, added.

MIL-STD-883, TEST METHOD 2011, CONDITION H

BOND STRENGTH TEST

This test is required to measure bond strengths to determine compliance with the applicable specification.

IEC-749, SECTION 6, BOND STRENGTH, METHOD F
IEC-749, Section 6, Bond Strength, Method F, provides an equivalent to the MIL-STD.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2011, Condition H, is equivalent to the IEC-749, Section 6, Bond Strength, Method F, with the force to be applied, added.

MIL-STD-883, TEST METHOD 2012

RADIOGRAPHY

The purpose of this examination is to non-destructively detect defects within the sealed case, especially those resulting from the sealing process and internal defects such as foreign objects, improper interconnecting wires, and voids in the die attach material or in the glass when glass seals are used.

ESCC 20900
ESCC 20900 supported by 2099000, Radiographic provides a near equivalent to the MIL-STD since it is based on both documents.

EQUIVALENCE STATUS
MIL-STD-883, Test Method 2012, is equivalent to ESCC 20900/2099000.

MIL-STD-883, TEST METHOD 2019

DIE SHEAR TEST

This test is required to determine the integrity of materials and procedures used to attach semiconductor die, or surface mount passive elements, to package headers or other substrates.

EQUIVALENCE STATUS
No equivalent.

MIL-STD-883, TEST METHOD 2020

PARTICLE IMPACT NOISE DETECTION

This test is required to detect loose particles inside a device cavity.

EQUIVALENCE STATUS
No equivalent.

IEC 115-1 (THIS IS THE IEC GENERIC SPECIFICATION FOR FIXED RESISTORS)

SECTION 4.25 – ENDURANCE

MIL-STD-202, Test Method 108, has enough flexibility to enable a test to be configured to meet the requirements of IEC at elevated temperatures but it does not allow the life testing to be performed under standard atmospheric conditions. (Para 4.2.1).

EQUIVALENCE STATUS
For tests at elevated temperatures (above +70 °C), IEC 115-1, Section 4.25, is equivalent to MIL-STD-202, Test Method 108.

For tests at standard atmospheric conditions there is no equivalent to the IEC method.

IEC 115-1

SECTION 4.5 – RESISTANCE

The purpose of the test is to measure the direct-current resistance of resistors. It is not to be used to measure contact resistance.

MIL-STD-202, Test Method 303, is a similar procedure with a small difference in the need to evaluate the result at +25 °C, whereas the IEC standard requires the evaluation to be done at +20 °C. Neither of the two procedures requires the measurement to be done at the reference temperatures merely that the measurements be corrected to the reference temperatures. Corrections may be made using the equation of IEC 115-1; Para. 2.2.20.2, or MIL-STD-202, Method 304, for which knowledge of the resistance temperature characteristic is required.

EQUIVALENCE STATUS
IEC 115-1, Section 4.5, is equivalent to MIL-STD-202, Test Method 303, provided the results are corrected to +20 °C.

IEC 115-1

SECTION 4.6 – INSULATION RESISTANCE

This test measures the resistance offered by the insulating members of a component to an impressed direct voltage tending to produce a leakage of current through or on the surface of these members.

MIL-STD-202, Test Method 302, is a similar method but there is no information on how the resistor is to be mounted during the measurement.

The IEC standard is specific in requiring the use of one of 3 methods:

- V-block mount.
- Foil wrap.
- Metal mounting plate.

EQUIVALENCE STATUS

If the mounting method is specified in the ESCC Detail Specification, IEC 115-1, Section 4.6, is equivalent to MIL-STD-202, Test Method 302.

IEC 115-1

SECTION 4.7 – VOLTAGE PROOF

The purpose of the test is to demonstrate the ability to withstand short-term overpotentials due to switching, surges and similar phenomena.

MIL-STD-202, Test Method 301, is entitled "Dielectric Withstanding Voltage". The title is a misnomer as many components have no dielectric material but the procedure is very useful.

EQUIVALENCE STATUS

IEC 115-1, Section 4.7, is equivalent to MIL-STD-202, Test Method 301.

IEC 169-1

DISCHARGE TEST (CORONA TEST): PARAGRAPH 14.11

The purpose of the test is to verify that cables and connectors are not prone to sustain leakage currents which may cause degradation of dielectrics.

There is a hysteresis effect in that the discharge inception voltage may be very much higher that the discharge extinction voltage.

To avoid permanent damage to the component, the test procedure should include an upper limit to the test voltage (possible the proof voltage).

EQUIVALENCE STATUS

MIL-C-39012, Para. 4.6.1.9 is equivalent to IEC 169-1, Para. 14.11.

IEC 302

STANDARD DEFINITIONS AND METHODS OF MEASUREMENT FOR PIEZOELECTRIC VIBRATORS OPERATING OVER THE FREQUENCY RANGE UP TO 30MHz

These tests are performed to determine the frequency and impedance at maximum transmission of a Π-Network containing the equivalent electric circuit of the vibrator under test.

EQUIVALENCE STATUS

No equivalent.

IEC 384-1 (THIS IS THE IEC GENERIC SPECIFICATION FOR FIXED CAPACITORS)

SECTION 4.23, ENDURANCE

This specification requires that endurance tests be performed as described in IEC 68-2-2, Test B: Dry Heat.

EQUIVALENCE STATUS

IEC 384-1, Section 4.23, is equivalent to MIL-STD-202, Test Method 108.

IEC 384-1

SECTION 4.5 – INSULATION RESISTANCE

The purpose of the test is to measure the resistance offered by the insulating members of a component to a direct impressed voltage tending to produce a leakage current through, or on the surface of the component.

The IEC standard prescribes 3 methods of securing a capacitor during test i.e.:

- Metal foil wrap (4.5.3.1)
- Mounting plate (4.5.3.2)
- V-block (4.5.3.3)

MIL-STD-202, Test Method 302, allows special preparations or conditions to be defined in the ESCC Detail Specification (Para 4.6).

EQUIVALENCE STATUS

IEC 384-1, Section 4.5, is equivalent to MIL-STD-202, Method 302.

IEC 384-1

SECTION 4.6 – VOLTAGE PROOF

This test checks the ability of a component to withstand short term over potentials due to switches, surges and similar transient phenomena.

The standard is specific about themounting arrangements, the electrical circuit to be used and the procedure.

Much of the text is devoted to protecting the DUT from damage and the operator from injury.

EQUIVALENCE STATUS

IEC 384-1, Section 4.6, is equivalent to MIL-STD-202, Method 301.

IEC 384-1

SECTION 4.7 – CAPACITANCE

The purpose of the test is to measure the capacitance of components.

The standard prescribes various test frequencies depending on the magnitude of the capacitance to be measured. Standard atmospheric conditions are adequate but there is provisional for tighter control over several conditions including ambient temperature.

A similar MIL-STD defines test frequencies without reference to the capacitance of the DUT but it does require that the result be measured at, or corrected to, +25 °C. The small differences are not usually important.

EQUIVALENCE STATUS
IEC 384-1, Section 4, is equivalent to MIL-STD-202, Method 305.

IEC 410

SAMPLING PLANS AND PROCEDURES FOR INSPECTION BY ATTRIBUTES

This procedure established sampling plans and procedures for inspection by attributes.

MIL-STD-105 – SAMPLING PROCEDURES AND TESTS FOR INSPECTION BY ATTRIBUTES

This document is apparently being superseded by ANSI/ASQC Z1.4. However this cannot be fully confirmed at this present time. This MIL-STD provides the same plans and procedures as the IEC and is considered equivalent.

EQUIVALENCE STATUS
IEC 410, is equivalent to MIL-STD-105.

IEC 440

METHOD OF MEASUREMENT OF NON-LINEARITY IN RESISTORS

These tasks are performed to determine the magnitude of non-linear distortion generated in a resistor.

EQUIVALENCE STATUS
No equivalent.

IEC 444-2

MEASUREMENT OF QUARTZ CRYSTAL UNIT PARAMETERS BY ZERO PHASE TECHNIQUE IN A Π-NETWORK

The purpose of this test is to measure the motional capacitance of quartz crystal units in the frequency range 1MHz to 125MHz with a total measurement error of the order of 5%.

EQUIVALENCE STATUS
No equivalent.

IEC 512-2, TEST 2e

CONTACT DISTURBANCE

The object of this test is to detect contact disturbance of electro-mechanical components within the scope of Technical Committee No. 48, under specified dynamic conditions.

EQUIVALENCE STATUS
No equivalent.

IEC 512-4 (ELECTRO-MECHANICAL COMPONENTS FOR ELECTRONIC EQUIPMENT: BASIC TESTING PROCEDURES AND MEASURING METHODS - PART 4)

DYNAMIC STRESS TESTS

These tests are performed to determine the suitability of components to withstand steady state acceleration, Bump, Shock, and Vibration on electro-mechanical components within the scope of Technical Committee No.48.

EQUIVALENCE STATUS
No equivalent.

IEC 512-6

BASIC TESTING PROCEDURES AND MEASURING METHODS FOR ELECTRO-MECHANICAL COMPONENTS FOR ELECTRONIC EQUIPMENT

These tasks are performed to determine the suitability of components to withstand climatic and solderability tests on electro-mechanical components within the scope of Technical Committee No. 48.

EQUIVALENCE STATUS
No equivalent.

IEC 68-2-1, TEST Aa

COLD TEST

The cold test is required to determine the ability of a component to be used, or stored, at low temperature. Test Aa is a cold test for non-heat-dissipating specimens, with a sudden change of temperature. This test is employed where it is known that the effects of a sudden change of temperature are not detrimental to the test specimen.

MIL-STD-202, TEST METHOD 107
MIL-STD-202, Test Method 107 provides the nearest equivalent to the IEC. However, the MIL-STD describes a thermal shock test, alternating between extremes of high and low temperatures for a number of cycles. The IEC test is primarily concerned with the effects of storage. Equivalence could be achieved if all of the required test conditions were stated. Test duration is measured from the time when temperature stability has been attained.

EQUIVALENCE STATUS
IEC 68-2-1, Test Aa, is equivalent to MIL-STD-202, Test Method 107, with all of the required test conditions, including temperature, duration and recovery times, stated.

IEC 68-2-2, TEST Ba

DRY HEAT

The dry heat test is required to determine the suitability of non-heat-dissipating components for use, or storage, under high temperature and for which the subjection to a sudden change in temperature has no detrimental effect.

MIL-STD-202, TEST METHOD 108

MIL-STD-202, Test Method 108, provides an equivalent procedure to the IEC. However the maximum allowable humidity, the test temperature and test duration would need to be stated.

EQUIVALENCE STATUS

IEC 68-2-2, Test Ba, is equivalent to MIL-STD-202, Test Method 108, with the maximum allowable humidity, test temperature, test duration and recovery time added.

IEC 68-2-3, TEST Ca

DAMP HEAT, STEADY STATE

The objective is to determine the suitability of components for use or storage at high humidity.

MIL-STD-202, TEST METHOD 103

MIL-STD-202, Test Method 103, provides an equivalent to the IEC.

EQUIVALENCE STATUS

IEC 68-2-3, Test Ca, is equivalent to MIL-STD-202, Test Method 103, provided the requirement is included that condensed water must not be re-circulated before being re-purified.

IEC 68-2-7, TEST Ga

ACCELERATION, STEADY STATE

Constant acceleration is used to determine the effects of centripetal force on components in order to identify weaknesses not necessarily detectable in shock or vibration tests.

MIL-STD-750, Method 2006, is almost identical in procedure but it contains little information on acceptance criteria.

The IEC standard allows for the component to be operational during the test.

EQUIVALENCE STATUS

IEC 68-2-7, Test Ga, is equivalent to MIL-STD-750, Method 2006, provided that acceptance criteria are prescribed.

IEC 68-2-11, TEST Ka

SALT MIST

The object of this test is to compare the resistance to deterioration from salt mist of specimens of similar construction. It is useful for evaluating the quality and uniformity of protective coatings.

EQUIVALENCE STATUS

IEC 68-2-11, Test Ka, is equivalent to MIL-STD-202, Test Method 101, provided that the test duration is added.

IEC 68-2-13, TEST M

LOW AIR PRESSURE

The objective of the test is to determine the ability of components to be stored, transported or used under conditions of low air pressure.

EQUIVALENCE STATUS

IEC 68-2-13, Test M, is equivalent to MIL-STD-202, Method 105.

IEC 68-2-14, TEST Na

RAPID CHANGE OF TEMPERATURE WITH PRESCRIBED TIME OF TRANSITION

The purpose of this test is to determine the ability of components, equipment or other articles to withstand rapid changes of ambient temperature.

EQUIVALENCE STATUS

IEC 68-2-14, Test Na, is equivalent to MIL-STD-202, Test Method 107, with the required temperature extremes, exposure time and number of cycles stated.

IEC 68-2-14, TEST Nb

CHANGE OF TEMPERATURE WITH SPECIFIED RATE OF CHANGE

The purpose of this test is to determine the ability of components, equipment or other articles to withstand and/or function during changes of ambient temperature.

EQUIVALENCE STATUS

There are no alternatives to this standard.

IEC 68-2-17, TEST Qc

CONTAINER SEALING, GAS LEAKAGE

The purpose of the test is to identify leaks in packages of components which are intended to be hermetically sealed.

Test Qc is suitable for the testing of electronic components.

Test Qc, Test Method 1, and MIL-STD-202 Test Method 112, Condition B, are similar methods requiring the pressure of test liquid to be 50.8 millibars, maximum. As the IEC test recommends the pressure to be "10 millibars or as otherwise prescribed" the two tests can be considered to be equivalent.

Test Qc, Test Method 2, may need to be used with caution as the test liquid must be at a temperature 1 °C to 5 °C above the maximum operating temperature of the component.

MIL-STD-202 Test Method 112, Condition A, is a similar test and it carries a warning that it is not suitable for components whose maximum rated temperature is less than +130 °C.

Test Qc, Test Method 3, has no counterpart in MIL-STD.

EQUIVALENCE STATUS

IEC 68-2-17, Test Qc, Method 1, is equivalent to MIL-STD-202 Test Method 112, Condition B.

IEC 68-2-17, Test Qc, Method 2, is equivalent to MIL-STD-202 Test Method 112, Condition A.

IEC 68-2-17, Test Qc, Method 3, has no MIL-STD Test Method equivalent.

IEC 68-2-17, TEST Qk

SEALING TRACER GAS METHOD WITH MASS SPECTROMETER

The purpose of the test is to identify leaks in packages of components which are intended to be hermetically sealed.

Test Qk is suitable for the testing of electronic components.

Test Qk, Test Method 1, is for components which are not filled with helium during manufacture.The procedure involves immersion in a pressurised helium atmosphere after sealing.

Test Qk, Test Method 2, is intended for components which are filled with helium during manufacture.

Test Qk, Test Method 3, is designed to test the integrity of unsealed components by providing a temporary seal and applying helium gas by means of a jet or pocket.

EQUIVALENCE STATUS

IEC 68-2-17, Test Qk, Method 1, is equivalent to MIL-STD-202 Test Method 112, Condition C, Procedure IIIa or IIIc.

If the impregnation phase of Procedure III is omitted then IEC 68-2-17, Test Qk, Test Method 2, is equivalent to MIL-STD-202 Test Method 112, Condition C, Procedure IIIa or IIIc.

IEC 68-2-17, Test Qk, Test Method 3, is equivalent to MIL-STD-883, Test Method 1014, Condition A4.

IEC 68-2-17, TEST Ql

BOMB PRESSURE TEST

The purpose of the test is to identify leaks in packages of components which are intended to be hermetically sealed.

Test Ql is suitable for the testing of electronic components.

Test Ql is a destructive test because liquid is encouraged to penetrate the component and any information gleaned is purely qualitative.

EQUIVALENCE STATUS

No equivalent.

IEC 68-2-20, TEST Ta

SOLDERABILITY OF WIRE AND TAG TERMINATIONS

MIL-STD-202, Test Method 208: "Solderability" has the same objective as the IEC Methods Ta and Tc but the test procedure is significantly different in that a standard wrapping wire is soldered to the component whereas the IEC method requires solder to be applied by dipping or iron without being connected to any external wire.

MIL-STD-883, Test Method 2003: "Solderability" would be a suitable alternative to Test Ta, Method 1 (Solder bath at +235 °C ±5 °C). The MIL method specifies a solder bath at +245 °C ±5 °C but the difference is insignificant.

There is no MIL Test Method equivalent to Method 2 (soldering iron) or Method 3 (solder globule).

EQUIVALENCE STATUS

IEC 68-2-20 Ta, Test Method 1, is equivalent to MIL-STD-202, Test Method 208.

IEC 68-2-20 Ta, Test Method 1, is equivalent to MIL-STD-750, Method 2026.

IEC 68-2-20 Ta, Test Method 1, is equivalent to MIL-STD-883, Test Method 2003.

IEC 68-2-20 Ta, Test Methods 2 and 3, have no suitable alternatives in MIL documents.

IEC 68-2-20, TEST Tb

RESISTANCE TO SOLDERING HEAT

This test demonstrates the ability of a component to survive intact after suffering a soldering operation.

MIL-STD-202, Test Method 210, contains procedures very similar to Test Tb Methods 1A and 1B which require the use of solder baths but there is no MIL method utilising a soldering iron.

EQUIVALENCE STATUS

IEC 68-2-20 Tb, Test Method 1A, is equivalent to MIL-STD-202, Test Method 210, Procedure 1, Condition B.

IEC 68-2-20 Tb, Test Method 1B, is equivalent to MIL-STD-202, Test Method 210, Procedure 1, Condition A.

IEC 68-2-21, TEST Ua_1

TENSILE

The procedures test the ability of components to survive the stresses intact encountered during normal assembly operations.

Apart from terminology and units there is much commonality with MIL-STD-202, Test Method 211, and equivalence is easily established.

EQUIVALENCE STATUS

IEC 68-2-21, Test Ua_1, is equivalent to MIL-STD-202, Test Method 211, Condition A.

IEC 68-2-21, TEST Ub

BENDING

The procedures test the ability of components to survive the stresses intact encountered during normal assembly operations.

Apart from terminology and units there is much commonality with MIL-STD-202, Test Method 211, and equivalence is easily established.

EQUIVALENCE STATUS

IEC 68-2-21, Test Ub, Test Method 1, is equivalent to MIL-STD-202, Test Method 211, Condition B.

IEC 68-2-21, Test Ub, Test Method 2, is equivalent to MIL-STD-202, Test Method 211, Condition C.

IEC 68-2-21, TEST Uc

TORSION

The procedures test the ability of components to survive the stresses intact encountered during normal assembly operations.

Apart from terminology and units there is much commonality with MIL-STD-202, Test Method 211, and equivalence is easily established.

EQUIVALENCE STATUS

IEC 68-2-21, Test Uc, Test Method 1, is equivalent to MIL-STD-202, Test Method 211, Condition D.

IEC 68-2-21, Test Uc, Test Method 2, has no MIL equivalent.

IEC 68-2-21, TEST Ud

TORQUE

The procedures test the ability of components to survive the stresses intact encountered during normal assembly operations.

Apart from terminology and units there is much commonality with MIL-STD-202, Test Method 211, and equivalence is easily established.

EQUIVALENCE STATUS

IEC 68-2-21, Test Ud, is equivalent to MIL-STD-202, Test Method 211, Condition E.

IEC 68-2-27, TEST Ea

SHOCK

The shock test is intended to show the ability of components to survive infrequent but severe shocks intact such as may be produced by rough handling, transportation or field use.

MIL-STD-202, TEST METHOD 213

MIL-STD-202, Test Method 213, is virtually identical to the IEC standard.The small differences are considered to be insignificant.

Both documents give guidance on the performance of the test and the measuring equipment used but the IEC standard gives more useful information on interpretation of the results.

MIL-STD-750, TEST METHOD 2016

MIL-STD-750, Test Method 2016, provides an equivalent to the IEC. The duration of the applied shock is slightly shorter with the MIL-STD test, but not to a significant extent. There is a slight discrepancy in the upper frequency of the measurement transducer. This is not considered to be significant.

EQUIVALENCE STATUS

IEC 68-2-27, Test Ea, is equivalent to MIL-STD-202, Test Method 213.

IEC 68-2-27, Test Ea, is equivalent to MIL-STD-750, Test Method 2016.

IEC 68-2-29, TEST Eb

BUMP

The bump test is required to determine the ability of a device to withstand specified severities of bump.

MIL-STD-202, TEST METHOD 213

MIL-STD-202, Test Method 213, provides an equivalent to the IEC. The MIL-STD test is a shock test, however the pulse duration, peak acceleration, corresponding velocity change and number of pulses require to be specified for complete equivalence.

EQUIVALENCE STATUS

IEC 68-2-29, Test Eb, is equivalent to MIL-STD-202, Test Method 213, with the required pulse duration, peak acceleration, corresponding velocity change and number of pulses specified.

IEC 68-2-30, TEST Db

DAMP HEAT, CYCLIC

This test is performed to determine the suitability of components for use and storage under conditions of high humidity when combined with cyclic temperature changes and producing condensation on the surface of the component. Test severity is determined by the upper temperature of the cycle and the number of cycles.

MIL-STD-202, TEST METHOD 106

MIL-STD-202, Test Method 106, provides a test method which, with additions to the ESCC Generic Specification, could be adapted to meet the requirements of the IEC. For equivalence, the cold cycle specified within the MIL-STD would not be performed and the upper temperature of the cycle, the number of cycles required and a description of the 24 hour cycle would need to be stated.

EQUIVALENCE STATUS

IEC 68-2-30, Test Db, is equivalent to MIL-STD-202, Test Method 106, with a description of the cycle to be given, together with the upper temperature of the cycle and number of cycles required.

IEC 68-2-35, TEST Fda

RANDOM VIBRATION WIDE BAND REPRODUCIBILITY HIGH

The purpose of this test is to determine the ability of components and equipment to withstand specified severities of random vibration.

EQUIVALENCE STATUS

IEC 68-2-35, Test Fda is equivalent to MIL-STD-202, Test Method 214, however the test condition, deviation, order of application of vibration direction and measurements require to be specified for complete equivalence.

ASTM B 298-94

This standard covers silver-coated, soft or annealed, round copper wire, intended for electrical use.

EQUIVALENCE STATUS

There are no equivalents to this standard.

ESCC BASIC SPECIFICATION NO. 20400

INTERNAL VISUAL INSPECTION

This specification lays down internal visual inspection criteria for electrical, electronic and electro-mechanical components.

EQUIVALENCE STATUS

MIL-STD-883, Method 2010, contains similar procedures for monolithic microcircuits.

MIL-STD-750, Method 2072, contains similar procedures for transistors.

MIL-STD-750, Methods 2073 and 2074, contain similar procedures for diodes.

ESCC BASIC SPECIFICATION NO. 20500

EXTERNAL VISUAL INSPECTION

This specification lays down external visual inspection criteria for electrical, electronic and electro-mechanical components.

EQUIVALENCE STATUS

MIL-STD-883, Method 2009, contains similar procedures for monolithic microcircuits.

ESCC BASIC SPECIFICATION NO. 20900

RADIOGRAPHIC INSPECTION

The objective of the inspection is to verify that there are no mechanical defects inside the sealed package.

EQUIVALENCE STATUS

MIL-STD-750, Method 2076, is equivalent to ESCC Basic Specification No. 20900.

ESCC BASIC SPECIFICATION NO. 21400

SCANNING ELECTRON MICROSCOPE INSPECTION OF SEMICONDUCTOR DICE

The purpose of the test is to assess the quality and acceptability of semiconductor dice.

EQUIVALENCE STATUS

MIL-STD-750, Method 2077, is an equivalent procedure to ESCC Basic Specification No. 21400, providing that facilities are also available for depositing a conductive film.

MIL-STD-883, Method 2018, is an equivalent procedure to the ESCC Basic Specification No. 21400.

ESCC BASIC SPECIFICATION NO. 22900

TOTAL DOSE STEADY STATE IRRADIATION

This specification describes the requirements and test methods to determine the effects of steady-state radiation in the evaluation of new technologies and in the qualification and procurement of high-reliability components.

EQUIVALENCE STATUS

MIL-STD-883, Method 2018, is equivalent to ESCC Basic Specification No. 22900, providing acceptance criteria are prescribed.

ESCC BASIC SPECIFICATION NO. 24800

This specification describes the requirements applicable to resistance to solvents of marking, materials and finishes.

EQUIVALENCE STATUS

MIL-STD-202, Method 215, "Resistance to Solvents", is equivalent to ESCC Basic Specification No. 24800, provided that the solvents, temperatures and rubbing materials are prescribed.

MIL-STD-883, Method 2015, is equivalent to ESCC Basic Specification No. 24800.

IEC 68-2-45, Test XA, "Immersion in Cleaning Solvents", is equivalent to ESCC Basic Specification No. 24800, provided that the solvents, temperatures and rubbing materials are prescribed.

FED-STD-228, TEST METHOD 3211

This standard gives the general physical, electrical and chemical methods for testing insulated wire and cable used for electrical purposes.

EQUIVALENCE STATUS
There are no alternatives to this standard.

FED-STD-228, TEST METHOD 6031

This standard gives the general physical, electrical and chemical methods for testing insulated wire and cable used for electrical purposes.

EQUIVALENCE STATUS
There are no alternatives to this standard.

FED-STD-228, TEST METHOD 6041

This standard gives the general physical, electrical and chemical methods for testing insulated wire and cable used for electrical purposes.

EQUIVALENCE STATUS
There are no alternatives to this standard.

FED-STD-228, TEST METHOD 6111

This standard gives the general physical, electrical and chemical methods for testing insulated wire and cable used for electrical purposes.

EQUIVALENCE STATUS
There are no alternatives to this standard.

FED-STD-228, TEST METHOD 6211

This standard gives the general physical, electrical and chemical methods for testing insulated wire and cable used for electrical purposes.

EQUIVALENCE STATUS
There are no alternatives to this standard.

APPENDIX 'A' - ISSUE STATUS OF TEST METHODS WITH APPLICABLE SPECIFICATIONS

APPLICABLE DOCUMENTS

The following lists of documents are those referred to in the Generic Specifications of the ESCC System. They set out the procedures and test methods to be used for the evaluation, qualification, life, endurance and production testing of electronic, electrical and electromechanical components for use in space applications.

1. ESCC BASIC SPECIFICATIONS

Basic Specification No.	Issue No.	Date	Title
20100	3A	June 96	Requirements for the Qualification of Standard Electronic Components for Space Application
20400	2	Sept 94	Internal Visual Inspection
2043000	1A	May 96	Internal Visual Inspection of Capacitors
2043501	1A	Sept 97	Internal Visual Inspection of Crystal Units
2043600	1A	June 93	Internal Visual Inspection of Electromagnetic Relays
2044000	1	Sept 94	Internal Visual Inspection of Resistors
2045000	2	Oct 95	Internal Visual Inspection of Semiconductor Devices
20500	3A	Feb 98	External Visual Inspection
2053000	1	Sept 94	External Visual Inspection of Capacitors
2053102	1	Sept 94	External Visual Inspection of Waveguides
2053400	2	Sept 97	External Visual Inspection of Electrical Connectors
2053600	1	Sept 94	External Visual Inspection of Electromagnetic Relays
2054000	1	Sept 94	External Visual Inspection of Resistors
2059000	1	Sept 94	External Visual Inspection of Integrated Circuits
20900	3	Apr 95	Radiographic Inspection
2093000		Sept 94	Radiographic Inspection of Capacitors
2093501		Sept 94	Radiographic Inspection of Crystal Units
2094000		Sept 94	Radiographic Examination of Resistors
2095000		Sept 94	Radiographic Examination of Semiconductor Devices
2099000	1	Sept 94	Radiographic Examination of Integrated Circuits
21400 *	3A	May 95	SEM Inspection of Semiconductor Dice
2145010	1	Sept 94	SEM Inspection of Semiconductor Dice for Discrete Microwave Semiconductor Devices
22900	4	Apr 95	Total Dose Steady State Irradiation Test Method
24400	1A	June 95	Measurement of Insertion Loss for E.M.I. Suppression Filters
24800	2A	May 94	Resistance to Solvents of Marking Materials and Finishes

* In-process inspection.

2. ESCC GENERIC SPECIFICATIONS

The following list of Generic Specifications was taken from ESA/SCC REF001 Issue 98/2 dated August 1998 and are the documents to which the Test Methods and Procedures are referred.

Generic Specification No.	Issue No.	Title
3001	6A	Capacitors, Fixed, Ceramic Dielectric
3002	4C	Capacitors, Tantalum, Solid Electrolyte
3003	3A	Capacitors, Tantalum, Non-Solid Electrolyte
3004	2B	Capacitors, Fixed, Glass Dielectric
3006	4A	Capacitors, Fixed, Metallised Plastic Film Dielectric
3007	2B	Capacitors, Fixed, Mica Dielectric
3008	4	Capacitors, Filter
3009	6A	Capacitors, Fixed, Chip, Ceramic Dielectrics Types I and II
3010	2C	Capacitors, Variable, Concentric Trimmer
3011	2A	Capacitors, Chip, Tantalum, Solid Electrolyte
3012	2	Capacitors, Leadless, Surface Mounted, Tantalum, Solid Electrolyte Enclosed Anode Connectors
3102	1B	Waveguide Filters and Multiplexers with Waveguide and Coaxial Interfaces
3201	3B	Radio Frequency Coils, Fixed
3202	2	Ferrite Microwave Components, Isolators and Circulators
3401	7A	Connectors, Electrical, Circular and Rectangular
3402	8	Connectors, Radio Frequency, Coaxial
3403	3A	Attenuators and loads, RF Coaxial, Fixed
3404	2A	Power Dividers Couplers, RF Coaxial
3405	1C	Connectors, Electrical, Filtered, Circular and Rectangular.
3501	4	Quartz Crystal Units
3502	2	Surface Acoustic Wave (SAW) Devices (Filters)
3601	4D	Relays, Electro-Magnetic, Non-latching
3602	4C	Relays, Electro-Magnetic, Latching
3701	2C	Toggle Switches
3702	2A	Switches, Thermostatic, Bimetallic, Hermetically Sealed
3901	4C	Wires and Cables, Electrical, 600V, LF
3902	4B	Wires and Cables, RF, Flexible
3903	1D	Solid Wires, Electrical 350 Volts for Wire Wrapping
4001	6C	Resistors, Fixed, Film
4002	4B	Resistors, Fixed, Wirewound
4003	5	Resistors, Fixed, Wirewound,
4005	3C	Power Resistor Networks, Thick film
4006	3	Thermistors

Generic Specification No.	Issue No.	Title
4009	3A	Resistors, Heaters, Flexible
5000	8C	Discrete Semiconductor Devices
5010	5	Discrete Microwave Devices
9000	9C	Monolithic Integrated Circuits
9010	1A	Monolithic Microwave Integrated Circuits (MMICs)
9020	1C	Charge Coupled Devices, Silicon, Photosensitive

A-2.1 Identification of Test Methods

Each Generic Specification listed in Section 3 of this report has had the information on test methods extracted and presented as a summary at the front of the detailed review of each Generic Specification. The appropriate US-MIL-STD and IEC or other reference has been given against each test method where applicable. Where no specification is given against a test method, the details of the test to be performed are given in the Generic Specification.

N.B.

IEC 68-2-20A - Resistance to soldering - referred to in a number of Generic Specifications is no longer listed in the 1995 Catalogue of IEC Publications. It has presumably been withdrawn and the requirements incorporated into IEC 68-2-20, as Amendment No 2 (1987).

3. IEC SPECIFICATIONS

68	Basic Environmental Test Methods
68-1	General and Guidance, 1992 BS EN 60068-1, 1995
68-2	Part 2: Tests (individual Tests as follows)
68-2-1	5th edition, 1990, amendment 2, 1994 Tests A: Cold BS EN 60068-2-1, 1993
68-2-2	4th edition, 1974, amendment 2, 1994 Tests B: Dry Heat BS EN 60068-2-2, 1993
68-2-3	3rd edition, 1969 Test Ca: Damp Heat, Steady State
68-2-4	1960 (Spec. withdrawn it is not superseded) Test D: Damp Heat
68-2-6	5th edition, 1985 Test Fe and Guidance: Vibration (Sinusoidal) BS EN 60068-2-6, 1996
68-2-7	2nd edition, 1983, amendment 1, 1986 Test Ga and Guidance: Acceleration, Steady State BS EN 60068-2-7, 1993
68-2-11	3rd edition, 1981 Test Ka: Salt mist
68-2-13	4th edition, 1983 Test M: Low Air Pressure
68-2-14	5th edition, 1984, amendment 1, 1986 Test N:Change of Temperature

68-2-17	1994 Test Q: Sealing
68-2-20	4th edition, 1979, amendment 2, 1987 Test T: Soldering
68-2-21	4th edition, 1983, amendment 3, 1992 Test U: Robustness of Terminals and integral mounting devices BS EN 60068-2-21, 1997
68-2-27	3rd edition, 1987 Part 2: Tests, Test Ea and Guidance: Shock BS EN 60068-2-27, 1993
68-2-29	2nd edition, 1987 Part 2: Tests, Test Eb and Guidance: Bump BS EN 60068-2-29, 1993
68-2-30	2nd edition, 1980, amendment 1, 1985 Test Db and Guidance: Damp Heat Cyclic
68-2-35	1973, amendment 1, 1983 Test Fda: Random vibration wide band (To be withdrawn and superseded by 68-2-64)
115	Fixed Resistors for use in Electronic Equipment
115-1	2nd edition, 1982, amendment 4, 1993 Part 1: Generic Specification BS QC 400000, 1990
169	Radio - Frequency Connectors
169-1	2nd edition, 1987, amendment 1, 1996 Part 1: General Requirements and Measuring Methods BS 3041 Part 1, 1977
169-1-1	1st edition, 1987 Part 1: Electrical Tests and Measuring Procedures: Reflection Factor
255	Electrical Relays
255-5	1st edition, 1997 Specification for the insulation testing of electrical relays BS 5992: Part 3, 1980
302	1st edition, 1969 Standard definitions and methods of measurement for Piezo-electric vibrators operating over the frequency range up to 30 MHz.
315	Methods of measurement on radio receivers for various classes of emissions.
384	Fixed capacitors for use in Electronic Equipment
384-1	2nd edition, 1982, amendment 4, 1992 Part 1: Generic Specification BS 9930 Part 0, 1983
384-10	2nd edition, 1989, amendment 1, 1993 Part 10: Sectional Specification: Fixed multi-layer ceramic chip capacitors. Selection of methods of test and general requirements BS QC 301900, 1992
404	Magnetic Materials BS 6404
410	1st edition, 1973 Sampling Plans and procedures for inspection by attributes

440	1st edition, 1973 Methods of measurement of non-linearity in resistors BS 5694, 1979
444	Measurement of quartz crystal unit parameters by zero phase technique in a P1-network
444-1	2nd edition, 1986 Part 1: Basic method for the measurement of resonance frequency and resonance resistance of quartz crystal units by zero phase technique in a Pi-network BS 7681, Part 1, 1993
444-2	1st edition, 1980 Part 2: Phase offset method for measurement of motional capacitance of quartz crystal units BS 7681, 1993
444-3	1st edition, 1986 Part 3: Basic method for the measurement of two terminal parameters of quartz crystal units up to 200 MHz by phase technique in a Pi-network with compensation of the parallel capacitance Co. BS 7681, Part 3, Amendment 1, 1997
512	Electromechanical components for electronic equipment; basic testing procedures and measuring methods
512-2	2nd edition, 1985, Amendment 1, 1994 Page 5 of 9 Part 2: General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests
512-4	1st edition, 1976 Part 4: Dynamic stress tests BS 5772, Part 4, 1979
512-6	2nd edition, 1984 Part 6: Climatic tests and soldering tests BS 5772, Part 6, 1984
512-8	3rd edition, 1993 (Withdrawn, use spec BS 5772) Part 8: Connector tests (mechanical) and mechanical tests on contacts and terminations

4. US-MIL SPECIFICATIONS

A-4.1 MIL-STD-202F, Notice 13: Test Methods For Electronic And Electrical Component Parts

1. Environmental Tests (100 Class)	
101D	Salt Spray (Corrosion)
103B	Humidity (Steady State)
104A	Immersion
105C	Barometric Pressure (reduced)
106F	Moisture Resistance
107G	Thermal Shock
108A	Life (at elevated ambient temperature)
112E	Seal

2. Physical Characteristics Tests (200 Class)	
204D	Vibration, High Frequency
208H	Solderability
210D	Resistance to Soldering Heat
211A	Terminal Strength
213B	Shock (Specified Pulse)
215J	Resistance to Solvents

3. Electrical Characteristics Tests (300 Class)	
301	Dielectric Withstanding Voltage
302	Insulation Resistance
303	DC Resistance
305	Capacitance
307	Contact Resistance
310	Contact Chatter Monitoring
311	Life, Low Level Switching
312	Intermediate Current Switching

A-4.2 MIL-STD-750D, Notice 1: Test Methods For Semiconductor Devices

1. Environmental Tests (1000 Class)	
1021.2	Moisture Resistance
1026.5	Steady State Operation Life
1031.5	High Temperature Life (non-operating)
1032.2	High Temperature (non-operating) Life (LTPD)
1038.3	Burn-in (for Diodes and Rectifiers)
1039.4	Burn-in (for Transistors)
1040	Burn-in (for Thyristors (controlled rectifiers))
1056.7	Thermal Shock (glass strain)
1071.6	Hermetic Seal

2. Mechanical Characteristics Tests (2000 Class)	
2006	Constant Acceleration
2016.2	Shock
2017.2	Die Shear Strength
2026.10	Solderability
2036.4	Terminal Strength
2037	Bond Strength
2052.2	Particle Impact Noise Detection Test
2056	Vibration, Variable Frequency
2072.5	Internal Visual Transistor Pre-cap Inspection
2073	Visual Inspection for Die
2074.2	Internal Visual Inspection Discrete Semiconductor Devices
2076.2	Radiography
2077.3	Scanning Electron Microscopy

3. Electrical Characteristics Tests for Bipolar Transistors (3000 Series)	
3051	Safe Operating Area (Continuous DC)
3052	Safe Operating Area (Pulsed)
3053	Safe Operating Area (Switching)

4. Electrical Characteristics Tests for MOS Field Effect Transistors (3400 Series)	
3474.1	Safe Operating Area for Power MOSFETS or Insulated Gate Bipolar Transistors

A-4.3 MIL-STD-883E, Notice 1: Test Methods And Procedures For Microelectronics

1. Environmental Tests	
1004.7	Moisture Resistance
1005.8	Steady State Life
1008.2	Stabilisation Bake
1010.7	Temperature Cycling
1011.9	Thermal Shock
1014.10	Seal
1015.9	Burn-in Test
1019.5	Radiation, Total Dose

2. Mechanical Tests	
2001	Constant Acceleration
2002.3	Mechanical Shock
2003.7	Solderability
2004.5	Lead Integrity
2007.2	Vibration, Variable Frequency
2009.9	External Visual
2010.10	Internal visual (Monolithic)
2011.7	Bond Strength (destructive bond pull test)
2019.5	Die Shear Strength
2020.7	Particle Impact Noise Detection

A-4.4 Other US-MIL Specifications Referenced

MIL-STD-105E Sampling Methods (To be withdrawn and superseded by ANSI/ASQC Z1.4)	
MIL-C-17G	General Specification for Cables, Radio Frequency, Flexible & Semi-Rigid
MIL-W-81822	Wire, Electrical, Solderless Wrap, Insulated and Uninsulated, General Spec.

5. OTHER SPECIFICATIONS REFERENCED

A-5.1 US-FED-SPEC 228: Cable & Wire, Insulated; Methods of Testing

3211	Tensile Strength & Elongation
6031	Resistance, Electrical, Insulation
6041	Surface Resistance, Finished Wire & Cable
6111	Voltage Withstand, Insulated Wire & Cable
6211	Insulation Defects, Spark Test

N.B.
US-FED-SPEC 228 - referred to in a number of Generic Specifications is no longer available. It has been withdrawn and is not superseded.

A-5.2 ASTM-B298-94: Silver Coated or Annealed Copper Wire

A-5.3 ESA PSS Documents

PSS-01-201	Contamination and Cleanliness Control
PSS-01-708	Derating Requirements Applicable to Electronic, Electrical and Electro- Mechanical Components for ESA Space Systems
PSS-01-726	The Manual Soldering of High-Reliability Electrical Connections
PSS-01-301	Determination of the Susceptibility of Silver-Plated Copper Wire/Cable to 'Red Plague' Corrosion
PSS-01-720	The Crimping of High-Reliability Electrical Connections
PSS-01-730	The Wire Wrapping of High-Reliability Electrical Connections

6. DOCUMENTS NOT SPECIFIED BUT TO BE USED FOR COMPARISON PURPOSES WITH ESCC SPECIFICATIONS

BS CECC 00012 * (BS EN 100012)	Harmonised system of quality assessment for electronic components: Basic Specification: radiographic inspection of electronic components
BS CECC 00013 (1991)	Harmonised system of quality assessment for electronic components: Basic Specification: scanning electron microscope inspection of semiconductor dice
BS CECC 22000 (1993)	Harmonised system of quality assessment for electronic components: Generic Specification: Radio Frequency Coaxial connectors
BS CECC 30000 * (BS EN 130000)	Harmonised system of quality assessment for electronic components: Generic Specification: Fixed Capacitors
BS CECC 40000	BS CECC 40000
BS CECC 5000	Harmonised system of quality assessment for electronic components: Generic Specification: Discrete Semiconductor Devices
BS CECC 90000 * (BS EN 190000)	Harmonised system of quality assessment for electronic components: Generic Specification: Monolithic Integrated Circuits.
BS CECC 90000 * (BS EN 190000)	Addendum 1: Internal Visual Inspection

* Specifications no longer valid. (Use parenthesised specifications).

MIL-STD-202F	
209	Radiographic Inspection

MIL-STD-750D	
1015	Steady State primary photo-current irradiation procedure
1017.1	Neutron Irradiation
1019.4	Steady State total dose irradiation procedure
2071.3	Visual and mechanical examination
2073	Visual inspection for die (semiconductor diode)
2075	Decap internal visual design verification
MIL-STD-883E	
1017.2	Neutron Irradiation
1020.1	Radiation induced latch-up test procedure
1021.2	Dose rate threshold for upset of digital microcircuits
1023.2	Dose rate response of linear microcircuits
1032.1	Soft error test procedure
2008.1	Visual and mechanical External visual
2009.9	Radiography
2012.7	Internal visual inspection for DPA
2013.1	Internal visual and mechanical
2014	Physical dimensions
2016	Internal visual inspection for DPA

2017.7	Internal visual (hybrid)
2018.3	Scanning electron microscope (SEM) inspection of metallisation
5004.10	Screening procedures
5005.13	Qualification and quality conformance procedures

IEC 68 2-38	1st edition, 1974 Test Z/AD: Compatible temperature/humidity cyclic test
IEC 68-2-45	1st edition, 1980, amendment 1, 1993 Test XA & Guidance: Immersion in cleaning solvents.
IEC 68-2-47	1st edition, 1982 Mounting of components, equipment and other articles for dynamic tests including shock (Ed), Bump (Eb), Vibration (Fe and Fa) and steady state acceleration (Ga) and guidance.
IEC 68-2-48	1st edition, 1982 Guidance on the application of the tests of IEC Publication 68 to simulate the effects of storage.
IEC 147 * (IEC 60-747) 147-3 ** 147-4 **	Essential ratings and characteristics of Semiconductor devices and general principles of measuring methods 1st edition, 1970, supplement A, 1973 Part 3: Reference methods or measurement 1st edition, 1976 Part 4: Acceptance and Reliability
IEC 747 747-1 747-10 747-11	Semiconductor Devices. Discrete Devices 1st edition, 1983, amendment 3, 1996 Part 1: General 2nd edition, 1991, amendment 3, 1996 Part 10: Generic spec for discrete devices and integrated circuits 1st edition, 1985, amendment 1, 1991, Amendment 2, 1996 Part 11: Sectional spec for discrete devices
IEC 748 748-1	Semiconductor Devices, Integrated Circuits 1st edition, 1984, amendment 2, 1993 Part 1: General
IEC 749	1st edition, 1984, amendment 3, 1996 Semiconductor Devices. Mechanical and Climatic Test Methods

* Specifications no longer valid. (Use parenthesised specifications).

**Specifications have been withdrawn and are not superseded.