ECSS-Q-ST-60-14C Rev. 1 Corrigendum 1
2 March 2020

Space product assurance

Relifing procedure – EEE components

ECSS Secretariat
ESA-ESTEC
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Foreword

This Standard is one of the series of ECSS Standards intended to be applied together for the management, engineering, product assurance and sustainability in space projects and applications. ECSS is a cooperative effort of the European Space Agency, national space agencies and European industry associations for the purpose of developing and maintaining common standards. Requirements in this Standard are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

This Standard has been prepared by the ECSS Executive Secretariat, reviewed and approved by the ECSS Technical Authority.

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Change log

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ECSS-Q-ST-60-14B	Never issued
ECSS-Q-ST-60-14C 15 November 2008	First issue
ECSS-Q-ST-60-14C Rev.1 1 August 2019	First issue Revision 1 The major changes between ECSS-Q-ST-60-14C (15 November 2008) and this version are: • Creation of two relifing flows: one covering Class 1 and Class 2 components and the other covering Class 3 components • Harmonization with the latest version ECSS-Q-ST-60 • Introduction of the applicability of the relifing requirements to commercial components • Change of timing requirements for relifing (from 7+3 to 7+4+4 years) increasing the maximum elapsed time between date code and time of mounting from 10 to 15 years • Transformation of normative Annex A "Relifing report - DRD" by into informative Annex C "Guidelines for a Relifing report" • Deletion of informative Annex B "ESD" <u>Detailed Change Record:</u> Deleted requirements: 5a and b (merged and recreated as new 5f); 6.1.2a to j (moved, modified and recreated in clause 6.1.1); 6.2d; A.2.1a to d; Figure A-1. Added requirements: 4.2.3b; 5c to h; 6.1.1e to o (moved, modified and recreated from former clause 6.1.2 requirements); 6.1.1p and q; 6.1.4d; 6.5d; 7.1.1a to h, Table 7-1; 7.1.2a; 7.1.3a to d; 7.2a to e; 7.3a to c; 7.4 a; 7.5a to d; Modified requirements: 4.1.3a; 4.1.5a Note deleted; 4.1.6a; 4.2.3a; 4.2.4a and b (term “package” replaced by “container”); Table 5-1; 6.1.1c; Table 6-1; 6.1.3a; 6.1.4a; 6.1.5a (text of Note separated from text of requirement); 6.2c; 6.2e; 6.2f (brackets removed); 6.4a; 6.5b;

	Editorial changes: • Scope updated • Normative References and Terms and definitions updated • Heading of clause 4 updated • Heading of clause 4.2.4 changed from "Package" by "Container" • Heading of clause 5, 6 and 6.1.1 updated
ECSS-Q-ST-60-14C Rev. 1 Corrigendum 1 2 March 2020	First issue Revision 1 Corrigendum 1 This standard was approved by the ECSS Technical Authority at TA#69 on 19 February 2020 and contains the following changes with respect to ECSS-Q-ST-60-14C Rev. 1 (1 August 2019): • Correction of title of Normative Reference of IPC/JEDEC-J-STD-033D April 2018 • Addition of abbreviated terms for "MSL" and "AQL" • Addition of clause 3.5 "Nomenclature" • Correction of cross-references in requirement 5a and 5b • Correction of requirement 5c from "*ECSS parts manufacturer*" to read "*EEE parts manufacturer*" • Deletion of requirement 5f. that was a duplicate of 5e. • Completion of caption of Table 6-1 to contain "*for Class 1 and Class 2 programmes*" • Correction of the DOORS ECSS PUID and OUID numbers

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1
Scope

This standard specifies the requirements, also known as "relifing requirements", for the planned, intentional storage, control, and removal from storage of electronic, electrical and electromechanical parts which are intended to be used for space applications.

This standard covers the relifing of all components as defined by ECSS-Q-ST-60 and ECSS-Q-ST-60-13.

The relifing process is a lot quality control activity. The inspections and tests defined do not constitute an up-screening or up-grading of components to a higher level of quality than procured to.

In line with ECSS-Q-ST-60, this standard differentiates between classes of components through different sets of standardization requirements.

The classes provide levels of trade-off between assurance and risk. The highest assurance and lowest risk is provided by Class 1 and the lowest assurance and highest risk by Class 3. Procurement costs are typically highest for Class 1 and lowest for Class 3. Mitigation and other engineering measures can decrease the total cost of ownership differences between the three classes. The project objectives, definition and constraints determine which class or classes of components are appropriate to be utilised within the system and subsystems.

- Class 1 components are described in Clause 4, 5 and 6
- Class 2 components are described in Clause 4, 5 and 6
- Class 3 components are described in Clause 4, 5 and 7

The requirements of this document apply to all parties involved at all levels in the integration of EEE components into space segment hardware and launchers.

This standard is applicable to all EEE parts covered by ECSS-Q-ST-60 and used in space programmes.

This standard is not applicable to dice.

This standard may be tailored for the specific characteristic and constrains of a space project in conformance with ECSS-S-ST-00.

2
Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply, However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

ECSS-S-ST-00-01	ECSS system – Glossary of terms
ECSS-Q-ST-10-09	Space product assurance – Nonconformance control system
ECSS-Q-ST-60	Space product assurance – Electrical, electronic and electromechanical (EEE) components
ECSS-Q-ST-60-13	Space product assurance – Commercial electrical, electronic and electromechanical (EEE) components
ECSS-Q-ST-70-01	Space product assurance – Cleanliness and contamination control
ESCC 24900	Minimum Requirements for Controlling Environmental Contamination of Components
IPC/JEDEC J-STD-033D April 2018	Handling, Packing, Shipping and Use of Moisture,Reflow, and Process Sensitive Devices
ESCC 20600	Preservation, Packaging and dispatch of ESCC Electronic Components
ANSI ASQ Z1.4-2003 Revision 2008	Sampling procedures and tables for inspection by attributes

3
Terms, definitions and abbreviated terms

3.1 Terms from other standards

a. For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 apply, in particular for the following terms:

1. clean area
2. cleanliness
3. cleanroom
4. component
5. conformance
6. contamination
7. dependability
8. environment
9. inspection
10. performance
11. relifing
12. traceability

3.2 Terms specific to the present standard

3.2.1 antistatic material

material that minimizes the generation of static charges

NOTE 1 This term refers to the reduction of triboelectric charge generation.

NOTE 2 This property is not dependent upon material resistivity.

3.2.2 conductive material

<CONTEXT: ESD protection> material with the following characteristics:

— surface conductive type: materials with a surface resistivity less than 10^5 Ω/☐.

— volume conductive type: materials with a volume resistivity less than 10^4 Ω-cm.

3.2.3 container

receptacle which holds, restrains or encloses an item for the purpose of storage or transportation

3.2.4 (original) date code

code used by the EEE part manufacturer at assembly step that indicates the production date

NOTE 1 Generally four-figure codes; two for the year and two for the week.

NOTE 2 Special lot number can also identify the date code.

3.2.5 (relifing) date code:

code indicating the date an item is submitted to the last step of the relifing sequence

NOTE Four-figure code, two for the year and two for the week.

3.2.6 dissipative material

<CONTEXT: ESD protection> material with the following characteristics:

— surface conductive type: materials with a surface resistivity equal to or greater than 10^5 Ω/☐ but less than 10^{12} Ω/☐.

— volume conductive type: materials with a volume resistivity equal to or greater than 10^4 Ω-cm but less than 10^{11} Ω-cm.

3.2.7 electrostatic charge

negative or positive electrical charge present on the material or item surface, at rest

3.2.8 electrostatic discharge (ESD)

transfer of electrostatic charge between objects at different potentials caused by direct contact or induced by an electrostatic field

3.2.9 electrostatic discharge sensitive (ESDS)

tendency of the performance of EEE parts to be affected or damaged by an ESD event

3.2.10 ESD protected area

area which is constructed and equipped with the necessary ESD protective materials, equipment, and procedures, to limit ESD voltages below the sensitivity level of ESDS items handled therein

3.2.11 ESD protective material

material with one or more of the following properties: limits the generation of electrostatic charge, dissipates electrostatic charge, and provides shielding from electric fields

3.2.12 ESD protective packaging

packaging with ESD protective materials to prevent ESD damage to ESDS items

3.2.13 electrostatic shield

barrier or enclosure that prevents or attenuates the penetration of an electric field

3.2.14 handled or handling

actions during which items are hand manipulated or machine processed

3.2.15 identification

application of appropriate markings to ensure that the identity of an item is unfailingly indicated after preservation and each stage of packing

3.2.16 isolating material

<CONTEXT: ESD protection> material not defined as conductive or dissipative are considered to be isolating

3.2.17 package

support used for enveloping, protecting or containing materials

NOTE Different types of packages are normally used: Primary, intermediate and final packages

3.2.18 (primary) package

container, envelope or wrap holding an individual item

3.2.19 (intermediate) package

container holding two or more primary packages

3.2.20 (final) package

container holding one or more intermediate packages, used for transportation of supplies to the orderer

3.2.21 packaging

operations consisting in the preparation of supplies for transit and delivery.

NOTE The term includes preservation, identification and packing

3.2.22 packing

operation by which supplies are placed in container or wrapped and placed in containers

3.2.23 particle

unit of matter with observable length, width and thickness

NOTE A particle can be object of solid or liquid composition, or both, and generally between 0,001 μm and 1000 μm in size

3.2.24 preservation

cleaning of an item and the application of a suitable temporary protective, where necessary, to maintain the item in prime condition

3.2.25 relifing procedures

set of tests performed on an item previously stored to verify that its initial quality and reliability have not been affected by time

3.2.26 storage area

area in the storage site where EEE parts are stored and which contains one or more storage zones.

3.2.27 storage long duration

storage for which duration exceeds 3 years

3.2.28 storage site

geographical location where EEE parts are stored for a short, medium or long term period

NOTE For this site the requirements given in this standard apply: EEE parts manufacturer's premises, procurement Agency, EEE part user.

3.2.29 storage zone

defined space in which EEE parts are stored and which is equipped for the monitoring and the control of storage conditions.

3.2.30 triboelectric effect

generation of electrostatic charge on an object by rubbing or other type of contact.

3.3 Abbreviated terms

For the purpose of this Standard, the abbreviated terms from ECSS-S-ST-00-01 and the following apply:

Abbreviation	Meaning
AQL	acceptance quality limit
ASIC	application specific integrated circuit
CCD	charge coupled device
CDM	charge device model
DPA	destructive physical analysis

Abbreviation	Meaning
DSP	digital signal processor
EEE	electronic, electrical and electromechanical
ESCC	European space components coordination
ESD	electrostatic discharge
FPGA	field programmable gate arrays
HBM	human body model
JEDEC	joint electronic devices engineering council
MM	machine model
MMIC	microwave monolithic integrated circuit
MSL	moisture sensitivity level
NA	not applicable
NCR	nonconformance report
NSA	national space agency
RH	relative humidity
SCSB	space components steering board
VLSI	very large scale integration

3.4 Symbols

Ω	ohm
Ω/□	ohm per square
Ω-cm	ohm centimetre
µm	micrometer
V	Volt

3.5 Nomenclature

The following nomenclature applies throughout this document:

a. The word “shall” is used in this Standard to express requirements. All the requirements are expressed with the word “shall”.

b. The word “should” is used in this Standard to express recommendations. All the recommendations are expressed with the word “should”.

NOTE It is expected that, during tailoring, recommendations in this document are either converted into requirements or tailored out.

c. The words “may” and “need not” are used in this Standard to express positive and negative permissions, respectively. All the positive

permissions are expressed with the word "may". All the negative permissions are expressed with the words "need not".

d. The word "can" is used in this Standard to express capabilities or possibilities, and therefore, if not accompanied by one of the previous words, it implies descriptive text.

NOTE In ECSS "may" and "can" have completely different meanings: "may" is normative (permission), and "can" is descriptive.

e. The present and past tenses are used in this Standard to express statements of fact, and therefore they imply descriptive text.

4
Environmental parameters for handling and storage for Class 1 to Class 3 programmes

4.1 General rules and requirements

4.1.1 <<deleted>>

4.1.2 Procedures

ECSS-Q-ST-60-14_0470002

a. The following domains shall be covered and documented by procedures sent to the customer for information, on request:
   1. Storage area and storage zone
   2. Cleanliness
   3. ESD protection
   4. Packing and Packaging
   5. Handling
   6. Quality assurance.

4.1.3 Storage area and storage zone

ECSS-Q-ST-60-14_0470003

a. It shall be demonstrated that storage areas and storage zones provide such protection against vibration, electromagnetic fields, radiation fields and against light so that possible degradation of organic packaging material is prevented.

4.1.4 Cleanliness

ECSS-Q-ST-60-14_0470004

a. Rules for cleanliness efficiency shall be implemented.

ECSS-Q-ST-60-14_0470005

b. The working areas and the contained equipment shall be maintained as visually clean with no loose material.

ECSS-Q-ST-60-14_0470006

c. Access rules shall apply for personnel, materials and equipment.

ECSS-Q-ST-60-14_0470007

d. Storage areas shall conform to a cleanliness level as defined in ECSS-Q-ST-70-01 clause 5.3.1.4.

NOTE This cleanliness level is often called and known as “grey zone”.

4.1.5 ESD protection

ECSS-Q-ST-60-14_0470008

a. The efficiency of ESD protection measures in storage, handling and testing areas shall be demonstrated.

4.1.6 Packing – Packaging – Handling

ECSS-Q-ST-60-14_0470009

a. EEE parts manufacturers requirements or, by default, ESCC 20600 or IPC/JEDEC J-STD-033D (April 2018) shall apply for packing, packaging and handling.

4.1.7 Quality assurance requirements for storage areas

ECSS-Q-ST-60-14_0470010

a. The storage responsible entity shall establish and document the following:

1. Prohibited materials
2. Personnel access rules
3. Prohibited personnel actions
4. Measures and facilities to segregate and protect components during receiving, inspection, storage and delivery
5. Control measures to ensure that electrostatic discharge susceptible components are identified and handled only by trained personnel using anti static packaging and tools.

4.2 Storage conditions

4.2.1 Air

Normal air is used.

4.2.2 Temperature

ECSS-Q-ST-60-14_0470011

a. Temperature in the immediate vicinity of stored components shall at all times be maintained between a minimum temperature of 17 °C and a maximum temperature of 27 °C.

NOTE This is to avoid chemical reactions catalysis when it is too high or electronic reactions on certain technologies when it is too low.

4.2.3 Relative humidity (RH)

ECSS-Q-ST-60-14_0470012

a. RH in store cupboards shall be kept in the range 20 % to 65 % of RH.

NOTE This is to avoid, when combined with temperature, corrosion phenomena. The lower is the Relative Humidity the greater is the probability for ESD damage.

ECSS-Q-ST-60-14_0470059

b. EEE parts with MSL > 1 shall be stored, before and after relifing test sequence, in one of the following conditions:

1. Nitrogen,
2. Dry and ionised air in a range up to 20 % RH maximum,
3. Dry packs as specified in IPC/JEDEC J-STD-033D (April 2018).

4.2.4 Container

ECSS-Q-ST-60-14_0470013

a. The containers used during storage shall ensure protection against ESD as defined in clause 4.1.6 and against any form of corrosion or contamination.

ECSS-Q-ST-60-14_0470014

b. Parts shall be stored in containers such that it can be demonstrated that they offer protection against ESD, corrosion and contamination including the contamination induced by the package itself.

NOTE Their primary containers can be used as long as they meet this requirement.

ECSS-Q-ST-60-14_0470015

c. CCDs and opto-electronic sensors shall be stored in dry air or in neutral ambience, to prevent risks of cover glass pollution and moisture ingress.

5
Timing parameters for Class 1 to Class 3 programmes

a. <<deleted, modified and moved to 5d>>

b. <<deleted, modified and moved to 5e>>

ECSS-Q-ST-60-14_0470060

c. The maximum lifetime requirements of the EEE parts manufacturers shall be taken into account.

ECSS-Q-ST-60-14_0470016

d. In absence of EEE manufacturer's lifetime limitation and when required, relifing shall be performed between T1 and T2 according to the timing parameters given in Table 5-1.

NOTE 1 Relife can be anticipated before T1, provided dT remains applicable.

NOTE 2 For parts not planned to be mounted and to be kept in stock, relifing is not mandatory.

ECSS-Q-ST-60-14_0470057

e. In case of parts procured through an external procurement entity, the customer should require the supplier to state the minimum period of validity of parts, w.r.t. T1 or T2, after delivery.

ECSS-Q-ST-60-14_0470061

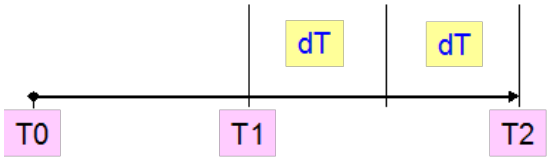
f. When started, all relifing tests as described in Table 6-1 and Table 7-1 shall be completed in a maximum period of six weeks.

ECSS-Q-ST-60-14_0470062

g. First of all, the maximum lifetime requirements of the EEE parts manufacturers shall be taken into account.

Table 5-1: Timing parameters

T1	T2	dT
7 years	15 years	4 years



T0 Original date code

T1 Maximum allowed storage period from T0 with no relifing control

T2 Maximum duration between the original date code of part and its mounting

dT Maximum allowed storage period after a relifing control which can be repeated once

6
Control parameters for Class 1 and Class 2 programmes

6.1 Test requirements

6.1.1 Requirements per EEE parts family:

ECSS-Q-ST-60-14_0470018

a. For relifing, the following tests, as specified in Table 6-1 shall be performed:

1. External Visual Inspection
2. Electrical measurements
3. Seal test
4. Specific test

ECSS-Q-ST-60-14_0470019

b. Component families not covered in Table 6-1 shall be subject to special procedures to be defined by the program.

NOTE The relifing procedure can be applied on a sub-lot containing only the quantity of components immediately needed for production. In this case, the relifing date-code is applicable only to parts actually tested. The time limits specified in Table 5-1 remain applicable for the residual sub-lot.

ECSS-Q-ST-60-14_0470020

c. When sampling is specified in Table 6-1, it shall be performed in accordance with AQL 0,65 % level II according to ANSI ASQ Z1.4-2003 Revision 2008.

ECSS-Q-ST-60-14_0470021

d. The specifications and methods to be used during relifing shall be those that were in effect for the initial procurement or, if demonstrated that they are not applicable, the most recent updated issues.

ECSS-Q-ST-60-14_0470022

e. Seal test shall be performed on components made with a hermetic cavity package in conformance with the applicable procurement specification.

ECSS-Q-ST-60-14_0470023

f. For ceramic chip or moulded capacitors, electrical measurement shall be done after 4 hours of stabilisation at 125 °C for Type II ceramic.

ECSS-Q-ST-60-14_0470024

g. Multi-chips (stacked) capacitors shall be submitted to 100% visual inspection and electrical testing.

ECSS-Q-ST-60-14_0470025

h. For all type of solid tantalum capacitors, the following specific tests shall be performed before the parametrical measurement:

1. Apply 9 discharges and 8 charges with a cycle time of 2 seconds and under nominal voltage and monitor the current during both charge and discharge tests to detect short circuit,
2. Perform a burn-in test for a duration or 96 hours at rated voltage at 85 °C.

ECSS-Q-ST-60-14_0470063

i. For all type of non-solid tantalum capacitors, the following specific test shall be performed before the parametrical measurement:

1. Perform a burn-in test for a duration or 96 hours at rated voltage at 85 °C.

ECSS-Q-ST-60-14_0470026

j. For film capacitors using the polycarbonate technology, a DPA test shall be performed on three pieces, including:

1. external visual inspection,
2. sealing test after insulate sleeve removal,
3. microsection on two pieces, and
4. decaping on third part.

ECSS-Q-ST-60-14_0470027

k. For programmed parts, the total duration, including storage and mission, shall not exceed data retention duration given by the manufacturer.

ECSS-Q-ST-60-14_0470058

l. For VLSI, hybrids and CCD, when electrical test is not practicable because of test program or product complexity, the validation may be transferred to use step such as functional tests or programming stages.

NOTE For example, VLSI can be ASIC, FPGA, MMIC, DSP, microprocessors, microcontrollers.

ECSS-Q-ST-60-14_0470029

m. For electromagnetic relays of latching and non-latching type, 10 switching shall be run before electrical measurements.

ECSS-Q-ST-60-14_0470030

n. For low frequency and radio-frequency wires and cables, the following shall be done:

1. inspect at least 0,5 m, and
2. remove 0,2 m of the insulating material.

ECSS-Q-ST-60-14_0470031

o. Electrical test shall be optional for cavity hermetically sealed qualified parts when the qualification level is in line with the quality level defined by the applicable Tables 7-1, Table 7-2 or Table 7-3 of ECSS-Q-ST-60.

ECSS-Q-ST-60-14_0470064

p. For cable assemblies, electrical test shall be limited to insulation resistance test.

ECSS-Q-ST-60-14_0470065

q. When relifed, commercial components shall be tested as defined in Table 6-1 providing in addition, the following:

1. the availability of endurance test results on the flight lot,
2. the availability of humidity test results on the flight lot as per ECSS-Q-ST-60-13, in case of non-hermetic package sensitive to humidity,
3. the availability of a report of DPA performed on 3 pieces for each lot of commercial components in the frame of the relifing procedure.

ECSS-Q-ST-60-14_0470056

Table 6-1: Control parameters and detailed application of categories for Class 1 and Class 2 programmes

	External Visual Inspection	ELECTRICAL (6.1.1o)	SEAL (6.1.1e)	SPECIFIC TESTS
capacitors, chip, ceramic	sampling	sampling (6.1.1f)	no	no
capacitors, moulded, ceramic	sampling (6.1.1g)	sampling (6.1.1f, 6.1.1g)	no	no
capacitors, glass (CYR, …)	100 %	100 %	no	no
capacitors, mica (HTxx, …)	100 %	100 %	no	no
capacitors, chip, solid tantalum (TAJ, T495, CWR11, …)	sampling	100 %	no	yes (6.1.1h)

	External Visual Inspection	ELECTRICAL (6.1.1o)	SEAL (6.1.1e)	SPECIFIC TESTS
capacitors, leaded, solid tantalum (CSR, …)	sampling	100 %	no	yes (6.1.1h)
capacitors, leaded, non solid (tantalum,(CLR79, …)	100 %	100 %	no	yes (6.1.1i)
capacitors, film (CRH, CHS, PMxx, MKTS, …)	sampling	100 %	no	yes (6.1.1j)
capacitors, variable	sampling	no	no	no
connectors, non filtered, rectangular	100 %	no	100 %	no
connectors, filtered, rectangular	100 %	100 %	100 %	no
connectors, non filtered, circular	100 %	no	100 %	no
connectors, filtered, circular	100 %	100 %	100 %	no
contacts, savers & accessories	no	no	no	no
crystals	100 %	100 %	100 %	no
diodes	100 %	sampling	100 %	no
diodes, microwave	100 %	sampling	100 %	no
Filters	100 %	100 %	100 %	no
fuses, "cermet"	sampling	sampling	no	no
fuses, wire link	sampling	sampling	no	no
heaters, flexible	100 %	100 %	no	no
inductors, coils, moulded	sampling	sampling	no	no
inductors, coils, non moulded	sampling	sampling	no	no
integrated circuits	100 %	sampling (6.1.1k, 6.1.1l)	100 %	no
integrated circuits, microwave	100 %	sampling (6.1.1l)	100 %	no
µwave passive parts (isolators, circulators)	100 %	sampling	no	no
µwave passive parts (power dividers, couplers)	100 %	sampling	no	no
µwave passive parts (attenuators, loads)	100 %	sampling	no	no
oscillators (hybrids)	100 %	100 %	100 %	no
relays, electromagnetic, latching and non-latching	100 %	100 % (6.1.1m)	100 %	no
resistors, fixed, film (RNC, MBx xxxx, ...) (except RNC90)	sampling	100 %	no	no

	External Visual Inspection	ELECTRICAL (6.1.1o)	SEAL (6.1.1e)	SPECIFIC TESTS
resistors, high precision, fixed, metal foil (RNC90, ...)	sampling	100 %	no	no
resistors, network, thick and thin film	sampling	100 %	no	no
resistors, current sensing (RLV, ...)	sampling	100 %	no	no
resistors, power, fixed, wirewound (RWR, ...)	sampling	sampling	no	no
resistors, power, fixed, wirewound, chassis mounted (RER, ...)	sampling	sampling	no	no
resistors, precision, fixed, wirewound (RBR, ...)	sampling	100 %	no	no
resistors, fixed, film, high voltage (RHV, ...)	sampling	sampling	no	no
resistors, fixed, thick and thin film, chip	sampling	100 %	no	no
switches, electromechanical	100 %	100 %	100 %	no
switches, thermostatic	100 %	100 %	100 %	no
thermistors	100 %	100 %	no	no
transformers	sampling	100 %	no	no
transistors	100 %	sampling	100 %	no
transistors, microwave	100 %	sampling	100 %	no
wires and cables, low frequency	sampling (6.1.1n)	no	no	no
cables, coaxial, radio frequency	sampling (6.1.1n)	no	no	no
hybrids	100 %	100 % (6.1.1l)	100 %	no
surface acoustic waves	100 %	100 %	100 %	no
charge coupled devices	100 %	100 % (6.1.1l)	100 %	no
opto discrete devices (photodiodes, LED, phototransistors, optocouplers, …)	100 %	100 %	100 %	no
HV cable assembly	100 %	100 %	no	no
cable assembly	100 %	100 % (6.1.1p)	no	no

6.1.2 <<deleted>>

a. <<deleted, modified and moved to 6.1.1e>>

b. <<deleted and moved to 6.1.1f>>

c. <<deleted, modified and moved to 6.1.1g>>

d. <<deleted, modified and moved to 6.1.1h>>

e. <<deleted and moved to 6.1.1j>>

f. <<deleted, modified and moved to 6.1.1k>>

g. <<deleted, modified and moved to 6.1.1l>>

h. <<deleted, modified and moved to 6.1.1m>>

i. <<deleted, modified and moved to 6.1.1n>>

j. <<deleted, modified and moved to 6.1.1o>>

6.1.3 Electrical testing

ECSS-Q-ST-60-14_0470032

a. A subset of DC parameters as given in the table of room temperature electrical measurements of the relevant procurement specification, ESCC or equivalent, shall be selected, submitted for customer approval on request and then measured.

NOTE 1 It is important to pay attention to the test and set up procedures which can have changed since the initial date code.

NOTE 2 Additional burn-in and drift calculation to be performed only when specified in Table 6-1.

6.1.4 External visual inspection

ECSS-Q-ST-60-14_0470033

a. In case of doubt or anomaly regarding any surface of the leads, one part shall be sampled in order to make a solderability test according to the applicable test method.

ECSS-Q-ST-60-14_0470034

b. The solderability test results shall be recorded in the relifing report.

ECSS-Q-ST-60-14_0470035

c. The part tested for solderability shall be considered destroyed.

ECSS-Q-ST-60-14_0470066

d. External Visual Inspection shall be done in accordance with applicable procurement specifications.

6.1.5 Seal test

ECSS-Q-ST-60-14_0470036

a. The sealing tests shall be recorded as "pass" where the results meet the requirements of the original procurement specification

NOTE Sealing tests include fine leaks or gross leaks or both, depending on the applicable specification.

ECSS-Q-ST-60-14_0470037

b. The measurement values of leaks on non-conforming components shall be recorded in the relifing report.

6.2 Nonconformance

ECSS-Q-ST-60-14_0470038

a. ECSS-Q-ST-10-09 shall apply for the handling and processing of nonconformances.

NOTE The processing of nonconformances is identical for both relifing and normal procurement procedures.

ECSS-Q-ST-60-14_0470039

b. Any components not satisfying at least one of the requirements included in this standard shall be considered as not conform.

ECSS-Q-ST-60-14_0470040

c. When performing the sampling test, as per Table 6-1, any batch of components failing the sampling rule defined in requirement 6.1.1c shall be considered as not conform.

ECSS-Q-ST-60-14_0470041

d. <<deleted>>

ECSS-Q-ST-60-14_0470042

e. In the case specified in 6.2c, the test shall be repeated on a 100% basis on the whole lot and the causes of the nonconformance investigated and recorded in the relifing report.

ECSS-Q-ST-60-14_0470043

f. In case of 100% test, as per Table 6-1, any batch of components shall be declared as not conform when failing the following requirement:

(a) lot size $\leq$ 100 parts : 0 defect allowed

(b) lot size > 100 parts : 1 defect allowed

6.3 Relifing datecode

ECSS-Q-ST-60-14_0470044

a. The relifing date code shall correspond to the week code of the first test performed on the lot.

ECSS-Q-ST-60-14_0470045

b. This date code shall be assigned independent of the report conclusions.

ECSS-Q-ST-60-14_0470046

c. The relifing date code shall not be marked on the component and no other additional marking added.

6.4 Relifing report

ECSS-Q-ST-60-14_0470047

a. When relifing a component, a relifing report shall be established and sent, on request, to the customer for information.

NOTE Guidelines of a Relifing report are given in Annex C.

6.5 Certificate of Conformity

ECSS-Q-ST-60-14_0470048

a. Once a batch is accepted, supported by a relifing report giving an "acceptable" decision or as a result of NCR processing, the original Certificate of Conformity shall be annotated with the relifing date code.

ECSS-Q-ST-60-14_0470049

b. The Certificate of Conformity shall be delivered with the components.

ECSS-Q-ST-60-14_0470050

c. Discarded batches shall be processed internally by the relevant reject system of the supplier.

ECSS-Q-ST-60-14_0470067

d. The relifing NCR, if any, signed and dated by the supplier, shall be delivered with the components.

7
Control parameters for Class 3 programmes

7.1 Test requirements

7.1.1 Requirements per EEE parts family

ECSS-Q-ST-60-14_0470068

a. For relifing, the following tests, as specified in Table 7-1 shall be performed:

1. External Visual Inspection
2. Electrical measurements
3. Specific test

NOTE The relifing procedure can be applied on a sub-lot containing only the quantity of components immediately needed for production. In this case, the relifing date-code is applicable only to parts actually tested. The time limits specified in Table 5-1 remain applicable for the residual sub-lot.

ECSS-Q-ST-60-14_0470069

b. When sampling is specified in Table 7-1, it shall be performed in accordance with AQL 0,65 % level II according to ANSI ASQ Z1.4.

ECSS-Q-ST-60-14_0470070

c. The relifing requirements defined in Table 7-1 shall apply to Class 3 programmes.

NOTE Components that are not listed in the Table 7-1 are not subject to relifing.

ECSS-Q-ST-60-14_0470071

d. The specifications and methods to be used during relifing shall be those that were in effect for the initial procurement or, if demonstrated that they are not applicable, the most recent updated issues.

ECSS-Q-ST-60-14_0470072

e. For all type of solid tantalum capacitors, the following specific tests shall be performed before the parametrical measurement:

1. Apply 9 discharges and 8 charges with a cycle time of 2 seconds and under nominal voltage and monitor the current during both charge and discharge tests to detect short circuit.
2. Perform a burn-in test for a duration of 96 hours, at rated voltage, at 85 °C.

ECSS-Q-ST-60-14_0470073

f. For all type of non-solid tantalum capacitors, the following specific tests shall be performed before the parametrical measurement:

1. Perform a burn-in test for a duration of 96 hours, at rated voltage, at 85 °C.

ECSS-Q-ST-60-14_0470074

g. For hybrids and commercial active parts, when electrical test is not practicable because of test program or product complexity, the validation may be transferred to use step such as functional test or programming stage.

ECSS-Q-ST-60-14_0470075

h. When relifed, commercial components shall be tested as defined in Table 7-1, providing in addition the following:

1. the availability of lifetest test results on the flight lot,
2. the availability of humidity test results on the flight lot as per ECSS-Q-ST-60-13, in the case of non-hermetic package sensitive to humidity,
3. a DPA is performed on 3 pieces for each lot of commercial components in the frame of the relifing procedure.

ECSS-Q-ST-60-14_0470076

Table 7-1: Control parameters and detailed application of categories for Class 3 programmes

Component family	External Visual Inspection	ELECTRICAL	SPECIFIC TESTS
capacitors, glass (CYR, …)	100 %	100 %	no
capacitors, chip, solid tantalum (TAJ, T495, CWR11, …)	sampling	100 %	yes (see 7.1.1e)
capacitors, leaded, solid tantalum (CSR, …)	sampling	100 %	Yes (see 7.1.1e)
capacitors, leaded, non solid (tantalum,(CLR79, …)	100 %	100 %	yes (see 7.1.1f)
through-hole components using glass beads	100%	no	No
opto discrete devices (photodiodes, LED, phototransistors, optocouplers, …)	100 %	100 %	No
Hybrids	100 %	100 % (see 7.1.1g)	No
oscillators (hybrids)	100 %	100 %	No
commercial active components	100%	sampling (see 7.1.1g)	No

7.1.2 Electrical testing

ECSS-Q-ST-60-14_0470077

a. A subset of DC parameters, as given in the Table of room temperature electrical measurements of the relevant procurement specification, ESCC or equivalent, shall be selected, submitted to customer's approval and then measured.

NOTE 1 It is important to pay attention to the test and set up procedures which can have changed since the initial date code.

NOTE 2 Additional burn-in to be performed only when specified inTable 7-1.

7.1.3 External visual inspection

ECSS-Q-ST-60-14_0470078

a. In case of doubt or anomaly regarding any surface of the leads, one part shall be sampled in order to make a solderability test according to the applicable test method.

ECSS-Q-ST-60-14_0470079

b. The solderability test results shall be recorded in the relifing report.

ECSS-Q-ST-60-14_0470080

c. The part tested for solderability shall be considered destroyed.

ECSS-Q-ST-60-14_0470081

d. In case of doubt or anomaly in the integrity of the glass sealing, parts shall be submitted to seal test according to the applicable test method.

7.2 Nonconformance

ECSS-Q-ST-60-14_0470082

a. ECSS-Q-ST-10-09 shall apply for the handling and processing of nonconformances.

NOTE The processing of nonconformances is identical for both relifing and normal procurement procedures.

ECSS-Q-ST-60-14_0470083

b. Any components that are not in compliance at least with one of the requirements of ECSS-Q-ST-10-09 shall be declared as not conform.

ECSS-Q-ST-60-14_0470084

c. When performing the sampling test, as per Table 7-1, any batch of components failing the sampling rule defined in requirement 7.1.1b shall be considered as not conform.

ECSS-Q-ST-60-14_0470085

d. In the case specified in 7.2c, the test shall be repeated on a 100 % basis on the whole lot and the causes of the nonconformance investigated and recorded in the relifing report.

ECSS-Q-ST-60-14_0470086

e. In case of 100 % test, as per Table 7-1, any batch of components shall be declared as not conform when failing the following "pass" conditions:

1. lot size $\leq$ 100 parts: 0 defect allowed
2. lot size > 100 parts: 1 defect allowed

7.3 Relifing datecode

ECSS-Q-ST-60-14_0470087

a. The relifing date code shall correspond to the week code of the last test performed on the lot.

ECSS-Q-ST-60-14_0470088

b. The relifing date code shall be assigned independent of the report conclusions.

ECSS-Q-ST-60-14_0470089

c. The relifing date code shall not be marked on the component and no other additional marking added.

7.4 Relifing report

ECSS-Q-ST-60-14_0470090

a. When relifing a component, a relifing report shall be established and sent, on request, to the customer for information.

NOTE Guidelines of an Relifing report are given in Annex C.

7.5 Certificate of Conformity

ECSS-Q-ST-60-14_0470091

a. Once a batch is accepted, supported by a relifing report giving an "acceptable" decision or as a result of NCR processing, the original Certificate of Conformity shall be annotated with the relifing date code.

ECSS-Q-ST-60-14_0470092

b. The Certificate of Conformity shall be attached with the components during their delivery.

ECSS-Q-ST-60-14_0470093

c. Discarded batches shall be processed internally by the relevant reject system of the supplier.

ECSS-Q-ST-60-14_0470094

d. The relifing NCR, if any, signed and dated by the supplier, shall be delivered with the components.

Annex A (normative)
<<deleted and recreated as informative Annex C>>

A.1 <<deleted>>

A.1.1 <<deleted>>

A.1.2 <<deleted>>

A.2 <<deleted>>

A.2.1 <<deleted>>

ECSS-Q-ST-60-14_0470051

a. <<deleted>>

ECSS-Q-ST-60-14_0470052

b. <<deleted>>

ECSS-Q-ST-60-14_0470053

c. <<deleted>>

ECSS-Q-ST-60-14_0470054

d. <<deleted>>

A.2.2 <<deleted>>

Annex B

Annex B (informative)
<<deleted>>

Annex C

Annex C

Annex C

Annex C

Annex C (informative) Guidelines for a Relifing report

C.1 Purpose of the Relifing report

The purpose of this document is to:

a. give the detailed references of the lot tested,

b. describe the relifing tests performed,

c. give the results obtained,

d. give the date of tests.

C.2 Content of the Relifing report

a. The Relifing report gives the following generic information:

   1. part style
   2. detailed specification (with issue and variant)
   3. item identification by the supplier
   4. quantity stored
   5. original datecode
   6. date of storage

b. For each test, the Relifing report indicates:

   1. operator
   2. date of test
   3. quantity tested
   4. quantity rejected
   5. comments

c. The Relifing report includes a conclusion, either accepted or rejected.

d. The Relifing report indicates, after relifing, the new datecode.

e. Figure C-1 shows a proposed template of a Relifing report.

Part Style:		
Detailed specification:	Issue:	Var:
Item identification at User:		
Quantity Stored:	Date code:	Date of Storage:

TESTS	RELIFING
1. External visual	
Operator	
Date	
Quantity tested	
Quantity rejected	
Comments	
2. Electrical tests	
Operator	
Date	
Quantity tested	
Quantity rejected	
Comments	
3. Hermeticity	
Operator	
Date	
Quantity tested	
Quantity rejected	
Comments	
4. DPA (if any)	
Operator	
Date	
Quantity tested	
Results	
DPA Report number	
5. Other tests	
Conclusion: Accepted / Rejected	
New date code	

Figure C-1: Example of a relifing traveller sheet

Bibliography

ECSS-S-ST-00	ECSS system – Description, implementation and general requirement.
MIL-HDBK-263	Electrostatic Discharge Control Handbook for protection of Electronic Parts, Assemblies and Equipment (excluding Electrically Initiated Explosive Devices)