ECSS-Q-ST-20C
15 November 2008

Space product assurance

Quality assurance

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Foreword

This Standard is one of the series of ECSS Standards intended to be applied together for the management, engineering and product assurance 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-Q-ST-20 Working Group, reviewed by the ECSS Executive Secretariat and approved by the ECSS Technical Authority.

Disclaimer

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Change log

ECSS-Q-20A 19 April 1996	First issue
ECSS-Q-20-B 8 March 2002	Second issue
ECSS-Q-ST-20C 15 November 2008	Third issue Major changes of this version of ECSS-Q-ST-20 with regard to the previous version are: • Transfer of PA related requirements to the newly established ECSS-Q-ST-10, Product assurance management; • Adaptation of structure of document and formulation of requirements to be consistent with ECSS drafting rules. • Deletion of ECSS-Q-20B or transfer to ECSS-Q-ST-10C: o Clause "4.6 Quality assurance programme audits" deleted; transferred to Q-ST-10 clause "5.1.4 PA audits"; o Clause "4.7 QA role in configuration management" deleted; transferred to Q-ST-10 clause "5.6 PA role in configuration management"; o Clause "4.8 Critical items control" deleted; transferred to Q-ST-10 clause "5.2 Critical items control and PA interfaces to project risk management"; o Clause "11 Operations" deleted. • New requirements: o Annex A of Q-20B: Ground Support Equipment moved to clause 5.8 of this document. o Annex A: DRD for QA Plan added.

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Scope

This Standard defines the quality assurance (QA) requirements for the establishment and implementation of a Quality Assurance programme for products of space projects.

Discipline related qualification aspects are complemented in standards specific to those disciplines (e.g. ECSS-E-ST-32-01 for fracture control).

For software quality assurance, the software product assurance standard, ECSS-Q-ST-80 is applicable.

This Standard is applicable to all space projects.

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	Space product assurance — Product assurance management
ECSS-Q-ST-10-04	Space product assurance — Critical-item control
ECSS-Q-ST-10-09	Space product assurance — Nonconformance control system

3
Terms and definitions

3.1 Terms from other standards

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

nonconformance

process

product assurance

quality assurance

3.2 Terms specific to the present standard

3.2.1 ground support equipment (GSE)

optical, mechanical, fluidic, electrical and software support equipment or systems used for example for calibration, measurements, testing, simulation, transportation, and handling of space segment or of space segment elements

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
AIV	assembly, integration, verification
BB	breadboard
CI	configuration item
DRB	delivery review board
	NOTE: DRB is synonymous to "Acceptance Review Board" (ARB) in ECSS-M-ST-10
DRD	document requirements definition
EEE	electrical, electronic, electromechanical
EGSE	electrical ground support equipment

EIDP	end item data package
FGSE	fluidic ground support equipment
FM	flight model
GSE	ground support equipment
MGSE	mechanical ground support equipment
MIP	mandatory inspection point
NRB	nonconformance review board
OGSE	optical ground support equipment
PA	product assurance
PM	project manager
QA	quality assurance
QM	qualification model
RFD	request for deviation
RFW	request for waiver
TRB	test review board
TRR	test readiness review

4
Quality assurance principles

4.1 QA management principles

The prime objective of Quality Assurance (QA) management is to ensure that a QA programme for projects covering mission definition, design, development and production of space systems is established, maintained and implemented.

All QA requirements are specified through definition and implementation of adequate methods and procedures.

Personnel whose performance determines or affects product quality are trained and certified in accordance with project needs.

4.2 General principles

The implementation of the following phase-independent activities is ensured by the QA function throughout the lead-time of projects:

- critical-items control
- nonconformance control
- alert management
- stamp control
- traceability
- metrology and calibration
- handling, storage and preservation
- statistical quality control (if required by the business agreement).

4.3 Design and verification principles

The objective of the QA function is to ensure that:

a. a set of design rules and methods has been set up and is consistent with the project techniques and technologies;

b. methods, procedures and tools have been defined and are implemented in order to prove that each applicable requirement is verified through one or more of the following methods: analysis, inspection, test, review of design, audits;

c. the design is producible and repeatable and that the resulting product can be verified and operated within the required operating limits;

d. design and verification activities are planned in a consistent and logical way;

e. the verification process is complete and includes clear test, test model and verification logic;

f. a defined qualification approach is implemented to demonstrate that the item performs satisfactorily in the intended environment.

4.4 Procurement principles

All procurement activities including selection of procurement sources, procurement documents, procurement source surveillance and receiving inspection are controlled to ensure that all procured items and services conform to requirements.

4.5 Manufacturing, assembly and integration principles

All manufacturing, assembly and integration operations are planned and performed in coordination with inspections and tests to ensure that the deliverables are built, assembled and integrated to the approved configuration baseline.

Special processes and new technologies are identified in a timely manner and adequate evaluation or qualification activities should be implemented in line with the overall schedule.

4.6 Testing principles

Test facilities and test equipment are validated prior to their use to ensure conformance to project requirements.

All tests are performed in accordance with documented and released procedures and results are comprehensively recorded.

4.7 Acceptance and delivery principles

The objective is to ensure that an acceptance and delivery process is implemented which allows demonstrating and documenting the conformance of the delivered item.

4.8 GSE principles

Design, production, delivery and maintenance requirements for GSE are defined and implemented allowing for testability, availability, safety, life duration, operability and ability to interface as necessary with space segment in a safe way

5
Quality assurance requirements

5.1 QA management requirements

5.1.1 Quality assurance plan

a. The supplier shall prepare, maintain and implement a QA plan in conformance with the DRD in Annex A.

b. The QA plan shall be submitted to the customer for approval.

NOTE Information on the schedule for delivery of the QA plan is given in Annex I.

5.1.2 Personnel training and certification

a. The supplier shall establish a documented training programme for the personnel whose performance determines or affects product quality.

b. Personnel performing special processes shall be trained and certified by internal or external training programmes.

NOTE The term "special process" is defined in ECSS-S-ST-00-01, Note 3 of the definition of "process".

c. Personnel inspecting or controlling special processes, or performing non–destructive testing and evaluation, shall be trained and certified according to training programmes and standards accepted by the customer.

d. The supplier shall maintain records of the training.

5.2 QA general requirements

5.2.1 Critical-items control

a. The supplier shall implement Critical-items control in conformance with ECSS-Q-ST-10-04.

5.2.2 Nonconformance control system

a. The supplier shall implement a nonconformance control system in conformance with ECSS-Q-ST-10-09.

5.2.3 Management of alerts

a. The supplier shall manage alerts in conformance with ECSS-Q-ST-10, clause 5.2.9.

5.2.4 Stamp control

a. The supplier shall establish and maintain a documented stamp control system to ensure the correct and legitimate use of all fabrication and inspection stamps.

b. Stamps shall be used to:

   1. signify the completion of operations and processes, and

   2. indicate inspection performance at source and incoming inspection, in process inspection and tests, final inspection, end point testing, storage and shipment.

c. The use of stamps shall be restricted to authorized personnel as identified in the stamp control system.

d. Stamps shall be traceable to individuals responsible for their use.

e. Stamps shall be applied directly to parts and materials, when specified by engineering drawings and specifications, and associated documents, records, labels.

f. Stamping materials and methods shall be compatible with the articles and their use.

g. Signatures instead of stamps may be used provided that similar traceability and responsibility records are maintained and available.

5.2.5 Traceability

a. The supplier shall ensure that a bidirectional and unequivocal relationship between parts, materials or products and associated documentation or records is established and maintained.

b. The supplier shall be capable to trace data, personnel and equipment related to procurement, manufacturing, inspection, test, assembly, integration and operations activities.

c. The supplier shall be capable to trace backward the locations of materials, parts, sub–assemblies.

d. The supplier shall be capable to trace forward the locations of materials from raw stock.

e. The supplier shall establish controls to ensure that:

1. identification numbers are assigned in a systematic and consecutive manner,
2. identification numbers of scrapped or destroyed items are not used again,
3. identification numbers, once allocated, are not changed, unless the change is authorized by the customer.

NOTE Requirements for identification are addressed in ECSS-M-ST-40.

5.2.6 Metrology and calibration

a. The supplier shall control, calibrate and maintain inspection, measuring and test equipment, whether owned by the supplier, on loan, or provided by the customer to demonstrate the conformance of product to the specified requirements.

b. The supplier shall use equipment in a manner which ensures that measurement uncertainty is known and is consistent with the specified measurement capability.

c. The supplier shall include in the calculations of all measurements the total error in the measurement process attributable to the cumulative error from the calibration chain, measuring equipment and those contributed by personnel, procedures and the environment.

d. The supplier shall record the basis for the calculation of the cumulative errors as specified in requirement 5.2.6c.

e. The supplier shall select inspection, measuring and test equipment in conformance with the required measurement accuracy and precision.

f. The supplier shall identify, calibrate and adjust all inspection, measuring and test equipment and devices that can affect product quality at prescribed intervals, or prior to use, against certified equipment.

g. The supplier shall establish, document and maintain calibration procedures, including details of equipment type, identification number, location, frequency of checks, check method, acceptance criteria and the action to be taken when results exceed the specified accuracy.

h. The supplier shall ensure that the inspection, measuring and test equipment is capable of the specified accuracy and precision.

i. The supplier shall identify inspection, measuring and test equipment with a suitable indicator or approved identification record to show the calibration status.

j. The supplier shall maintain calibration records for inspection, measuring and test equipment.

k. The supplier shall assess and document the validity of previous inspection and test results when inspection, measuring or test equipment is found to be out of calibration.

l. The supplier shall ensure that the environmental conditions are suitable for the calibrations, inspections, measurements and tests being carried out.

m. The supplier shall ensure that inspection, measuring and test facilities, including both test hardware and test software are protected against adjustments, which can invalidate the calibration setting.

n. The supplier shall ensure that the inspection, measuring and test equipment is handled, preserved and stored such that the accuracy and fitness for use is maintained.

o. The supplier shall check the test hardware or test software used for inspection to prove that it is capable of verifying the acceptability of the product prior to release for use during production and installation, and recheck it at specified intervals.

NOTE 1 Examples of test hardware are: jigs, fixtures, templates and patterns.

NOTE 2 Test aids such as test leads, break–out boxes, mains leads and similar items are not subject to the entire set of requirements defined in this clause, but are validated in a way appropriate to their usage.

p. The supplier shall establish the extent and frequency of such checks and shall maintain records as evidence of control.

q. The supplier shall make the measurement design data available to the customer upon request.

5.2.7 Handling, storage and preservation

5.2.7.1 Handling

a. The supplier shall prevent handling damage during all phases of manufacturing, assembly, integration, testing, storage, transportation and operation.

NOTE Possible prevention measures are:

- protection of items during handling,
- handling devices, or
- procedures and instructions.

5.2.7.2 Storage

a. The supplier shall place the following items in secure storage areas:

1. incoming materials,
2. intermediate items needing temporary storage, and
3. end items before shipping.

b. The supplier shall place the following items in designated segregated areas:

1. limited life materials,
2. suspended limited life materials,
3. nonconforming items awaiting NRB disposition,
4. scraped items,
5. items designated to be stored separately for health or safety reasons.

c. Each segregated area shall be identified and labelled for its intended use.

d. The supplier shall maintain control over acceptance into and withdrawal from storage areas.

e. The supplier shall maintain records to ensure that all stored items are within the usable life limits, controlled and retested, and to provide traceability within the storage or segregated area.

5.2.7.3 Preservation

a. The supplier shall ensure that items subject to deterioration, corrosion or contamination through exposure to any environmental elements are preserved by methods that ensure maximum protection consistent with life and usage.

NOTE Examples of such environmental elements are: air and moisture.

5.2.8 Statistical quality control and analysis

5.2.8.1 General

a. Statistical quality control and analysis methods shall be used to maintain or improve the specified control of quality, when statistically significant with respect to the product characteristics and to quantities produced.

NOTE Examples of statistical quality control and analysis methods are sample inspection plans, determination of quality levels, statistical process control and process capabilities studies.

b. When employing statistical quality control and analysis methods, the supplier shall ensure that all the conditions for use are enforced.

NOTE Example of such conditions are sample significance, recording and elaboration of data, and formulation of clear decision rules.

c. Statistical quality control applications, when used by the supplier for acceptance of materials, parts, processes and products, shall be submitted to the customer for approval.

5.2.8.2 Sampling plans

a. When sampling plans are used the supplier shall define and justify the following:

1. sample size, sample selection methods and criteria for inspection severity,
2. acceptance / rejection criteria, and
3. screening of rejected lots.

b. The supplier shall maintain records of the sampling tests, together with the identification of the characteristics to which sampling is applied.

5.3 QA requirements for design and verification

5.3.1 Design rules

5.3.1.1 Produceability

a. The supplier shall ensure that the product is designed such that it can be produced with the specified level of quality.

NOTE Produceability includes provisions for the following aspects:

- Design simplification and standardization, reduction in part types and part number.
- Guidelines for selection of preferred parts, materials and processes.
- Unambiguous definitions of the requirements and limits to be used.
- Definition of tolerance build–up methods, in order to simplify manufacturing, assembly, inspection.
- Standardization of interfaces.
- Part accessibility for assembly and inspection.
- Definition of design criteria consistent with the capability of manufacturing processes.
- Definition of design methods to ensure that the cleanliness requirements are compatible with the capability of related cleanliness procedures and facilities.

5.3.1.2 Repeatability

a. The supplier shall ensure that the product is designed such that its performances and characteristics can be reproduced over different models and serial production.

NOTE Repeatability includes provisions for the following aspects:

- Definition of standard tolerances generally applicable.

- Recommended design concepts and solutions to ensure repeatability.
- Recommended manufacturing processes having proven repeatability.
- Design criteria that optimize implementation of automated manufacturing methods, or computer–aided manufacturing.

5.3.1.3 Inspectability and testability

a. The supplier shall ensure that the product is designed such that it can be inspected and tested under representative conditions, for production, AIV and operational environment.

NOTE Inspectability and testability include provisions for the following aspects:

- Definition of inspection and test requirements, including acceptance or rejection criteria, expressed in an unambiguous and quantified manner.
- Part and component accessibility for inspection and test.
- Definition of tolerance methods for dimensional inspection performance (e.g. functional tolerances).
- Definition of recommended design techniques to facilitate fault detection, identification and location (e.g. test points, modularity, built–in test software, and feedback loops).

5.3.1.4 Operability

a. The supplier shall ensure that the product is designed such that it can be operated in accordance with programme constraints and requirements, throughout its whole life cycle including handling, storage, transportation, integration and operations.

5.3.2 Verification

5.3.2.1 General

a. The supplier shall ensure that requirement verification is performed progressively, as each stage of the project is completed, and provides the organized base of data upon which qualification and acceptance is incrementally declared.

b. The supplier shall ensure that top–down requirement allocations and bottom–up requirement verifications are complete and consistent.

c. The supplier shall ensure that a system for tracking requirements and verification of results is established and maintained during the whole project life cycle.

d. The supplier shall ensure that verification methods are adequate and consistent with the type and criticality of the requirements.

e. The supplier shall ensure that appropriate reference to the verification documentation is recorded and status updated at project reviews up to final acceptance.

5.3.2.2 Design verification analysis

a. The supplier shall ensure that the objectives of the analysis are defined in relation with the development logic defined in the verification plan.

b. The following items shall be identified:

1. reference of the configuration item definition under analysis;
2. environmental constraints considered in the analysis;
3. basic assumptions, analysis methods, mathematical models.

5.3.2.3 Design reviews

a. The supplier shall ensure that design reviews are conducted in accordance with project requirements and written procedures.

NOTE Design reviews address the following items:

- Quality requirements and criteria for design, produceability, repeatability, testability and operability are adequately considered in design documentation.
- Methods and data required for procurement, manufacturing, inspection and test are available and validated.
- Risks of not achieving requirements are highlighted and adequately controlled.

5.3.2.4 Qualification process

5.3.2.4.1 Qualification

a. The supplier shall ensure that all configuration items and their constituent items, either off–the–shelf or specifically designed, are properly qualified with margins commensurate with the application and use environment.

b. The supplier QA shall review and approve the qualification plan.

c. The supplier QA shall review and approve the qualification results.

5.3.2.4.2 Qualification by similarity

a. Qualification by similarity with an identical or similar product shall be justified by providing evidence that the new application is within the limits of the previously qualified design.

b. Any difference in definition with respect to the reference product and any difference in the required qualification tests shall be identified.

c. The need for complementary qualification tests shall be analysed and the decision justified and submitted to the customer for approval.

d. For this purpose the supplier shall:

   1. evaluate the as–designed or as–built configuration and related nonconformances,

   2. ensure that qualification requirements and qualification ranges are compatible with project requirements,

   3. ensure that qualification test results meet the requirements and any nonconformances are available for evaluation, and

   4. ensure that a logbook of the selected model is available for review.

5.3.2.4.3 Qualification testing

a. The product used for qualification testing shall be produced in accordance with a full and clearly identified manufacturing and inspection file.

b. To obtain authorization to initiate qualification tests the supplier shall demonstrate that:

   1. the qualification model is fully representative of the flight model and any differences have been analysed to evaluate their effect on the qualification status;

   2. inspection and test requirements are expressed in an unambiguous and quantified manner including:

      (a) test sequence;

      (b) test conditions;

      (c) test standards, if any;

      (d) applicable test levels, durations and tolerances;

      (e) accuracy in measurement.

   3. the qualification test procedures and facilities are defined, available and conforming to requirements of clause 5.6.

5.3.2.4.4 Qualification status

a. The supplier shall report the qualification status in conformance with the "Qualification status list" DRD as defined in ECSS-Q-ST-10.

5.3.2.4.5 Maintenance of qualification

a. Once the design is qualified, the supplier shall assess all subsequent changes, deviations and anomalies for their impact on the qualification status and shall perform requalification as necessary.

5.3.2.5 Design changes

a. The supplier shall ensure that all design changes and modifications are identified, documented, reviewed and approved before their implementation.

5.4 QA requirements for procurement

5.4.1 Selection of procurement sources

5.4.1.1 General

a. The supplier QA shall participate in the approval and the selection of procurement sources.

NOTE The selection of procurement sources for EEE components is defined in ECSS-Q-ST-60.

5.4.1.2 Selection criteria

a. The supplier shall select its suppliers on the basis of one of the following criteria:

1. The supplier has been certified by the final customer, and has a current approval to furnish items or services of the type and quality level being procured.

NOTE Third party certification (for instance against ISO 9001) can be also considered.

2. The supplier is furnishing, or has furnished within the past two years, items or services of the type and quality level being procured under other contracts with the final customer.

3. The supplier has demonstrated continuous capability to furnish items or services of the type and quality level being procured, supported by objective documentation.

NOTE This criterion does not apply if the supplier has not furnished items or services of the type being procured for more than two years.

4. Supplier's capability of satisfying business agreement requirements is demonstrated by a pre–award audit by the relevant customer.

b. The supplier shall document and maintain on file results of supplier selection process.

5.4.1.3 Record and list of procurement sources

a. The supplier shall establish and maintain records of all procurement sources involved in business agreement performance.

b. The supplier shall submit to the customer, upon request, the list of procurement sources, including all the information in the records 5.4.1.3a, for information.

5.4.2 Procurement documents

a. The supplier shall ensure that supplies are identified and that all applicable requirements are defined in the procurement documents.

b. The supplier shall ensure that requirements to those contained in lower tier procurement documents are traceable.

c. The procurement documents shall contain, by statement or reference:

1. comprehensive technical descriptions of the items and services to be procured,
2. details of the applicable requirements, such as requirements for preservation, packaging, marking, shipping, accompanying documentation and provisions for limited–life items,
3. details of QA activities to be performed, such as inspection and test characteristics, records and reports,
4. details of supplier's QA activities at source, and
5. special acceptance conditions.

d. The supplier's quality assurance organization shall review procurement documents prior to release, to verify the correct selection of procurement sources and appropriateness of their content.

5.4.3 Surveillance of procurement sources

a. The supplier shall exercise surveillance over all the activities carried out by lower level suppliers during business agreement performance.

b. The surveillance programme shall include audits, reviews, mandatory inspection points, as well as direct supervision by supplier's resident personnel at his suppliers' facilities and source inspection.

NOTE Example of review is the manufacturing readiness review.

c. The supplier shall select among the following criteria to define the type and extent of surveillance:

1. Testing or inspections cannot be accomplished by the supplier.

NOTE For example, environments or test equipment not available at supplier's facility.

2. Verification tests are destructive in nature and the quality cannot be verified solely by inspection or test at supplier's facility.

3. Supplies are designated for direct shipment from source to a customer site or the using site.

4. Manufacturing and AIV of complex equipment or subsystems.

NOTE For example, payloads.

5. Past performance or quality history of the lower level supplier is marginal.

6. Functional criticality and technical complexity of the supplies.

7. The degree of responsibility placed on the procurement source.

d. The supplier shall ensure that each of his suppliers implements surveillance on their lower level suppliers, in accordance with the same criteria.

e. Surveillance may be delegated by the customer to third parties.

5.4.4 Receiving inspection

5.4.4.1 General

a. The supplier shall ensure that all incoming supplies, including documentation and packaging, whether delivered on his own premises or elsewhere, conform to the requirements of the procurement documents.

b. The supplier shall perform inspections in accordance with established procedures and instructions, to ensure that quality level is properly determined.

NOTE 1 Sampling plans in receiving inspection are defined in 5.2.8.2.

NOTE 2 Receiving inspection of components is defined in ECSS-Q-ST-60.

NOTE 3 Lot or batch acceptance of materials and mechanical parts is defined in ECSS-Q-ST-70.

c. Receiving inspectors shall have available the procurement documents, specifications, drawings and any other document relevant to incoming supplies as required in the procurement documents.

5.4.4.2 Receiving inspection activities

a. Receiving inspection activities shall include:

1. verification of the packaging conditions and of the status of environmental sensors,

2. visual inspection of the delivered items,

3. verification of correct identification and, where appropriate, configuration identification for conformance to the ordering data,

4. verification of the evidence of inspection and tests performed by the supplier and associated documentation,

5. verification of the performance of supplier's source inspection, when required,
6. performance of inspections and tests on selected characteristics of incoming supplies or test specimens submitted with the supplies,
7. identification of the shelf life of limited-life items,
8. identification of the inspection status and physical separation of the supplies in the receiving inspection area according to the following categories:
   (a) items for which the receiving inspection has not been completed;
   (b) conforming items;
   (c) nonconforming items.
9. prevention of unauthorized use of uninspected items,
10. identification of the items to be released for production with conformance status and traceability data to be recorded in manufacturing documents,
11. maintenance of receiving inspection records in conformance with 5.4.4.4.

5.4.4.3 Customer furnished items

a. Receiving inspection of items supplied by the customer shall consist of the verification of identity and integrity after transportation.

NOTE Additional inspections and tests, if any, are specified in the business agreement.

5.4.4.4 Receiving inspection records

a. The supplier shall maintain receiving inspection records to ensure traceability and the availability of historical data to monitor supplier performance and quality trends.

5.5 QA requirements for manufacturing, assembly and integration

5.5.1 Planning of manufacturing, assembly and integration activities and associated documents

a. The supplier shall document the planning of manufacturing, assembly and integration operations and inspections in the manufacturing plan or flow chart for the product, including the sequence of operations and associated inspections and tests.

b. The planning shall include the identification of MIPs in conformance with 5.5.8, together with the reference to the procedures by which the various activities are performed and the required cleanliness levels and temperature and humidity requirements of the facilities.

c. Instructions shall direct the actual performance of manufacturing, assembly and integration operations and inspections, to ensure that the activities proceed in an orderly manner and according to the planned sequence.

NOTE For example: shop travellers.

d. The supplier shall issue and maintain manufacturing, assembly and integration documents in accordance with established and formal procedures.

e. The QA organization shall review and approve such documents, and any modifications thereof, to ensure that they include or refer to:

1. Identification of the item to be manufactured or equipment to be used.
2. Configuration data, including parts lists, drawings, changes and specifications.
3. Identification of the production and inspection equipment to be used for the manufacturing, assembly and integration of the item.

NOTE Examples of production and inspection equipment are tools, jigs and fixtures.

4. Identification of critical characteristics.

NOTE Critical characteristics are defined in ECSS-Q-ST-30.

5. Detailed definition, by description or reference, of manufacturing, assembly, integration, inspections and test operations to be performed, and special conditions to be maintained.
6. Provisions for inspections and tests to be witnessed by customer representative.
7. Accept or reject criteria (with tolerances) and workmanship standards.
8. Details of sampling inspection procedures to be used, if any.
9. Detailed procedures for the activities to be performed.

f. Only “first off” shop travellers shall be reviewed unless subsequent travellers incorporate a significant change of inspection requirements or order of events.

g. The supplier shall also provide for detail support documents and instructions, such as drawings, procedure and instruction sheets, to enable operations to be correctly performed.

5.5.2 Manufacturing readiness reviews

a. The supplier shall perform an internal review of the readiness for manufacturing, prior to starting the manufacture of the first flight–standard product.

b. The manufacturing readiness review shall evaluate the following aspects:

1. status of product definition and requirements, differences with the status of the qualification model, and impacts of these differences;
2. status of manufacturing, assembly, inspection and test documentation, differences with the status of the qualification model, and impacts of these differences;
3. validation status of manufacturing processes, with particular emphasis on critical processes;
4. implementation of dispositions for risk reduction, as defined by risk assessment, into the manufacturing, assembly, integration, inspection and test procedures;
5. availability of specified production, measuring and inspection equipment, and calibration status, when relevant;
6. cleanliness of facilities, with respect to the specified cleanliness levels;
7. facility temperature and humidity with respect to requirements.

5.5.3 Control of processes

5.5.3.1 General

a. The supplier shall monitor all processes used for manufacturing, assembly and integration, and enforce all applicable process requirements.

b. The supplier shall ensure that all manufacturing processes are covered by documented process specifications or standards.

NOTE Manufacturing process specifications are defined in ECSS-Q-ST-70.

c. Process specifications shall include QA provisions, methods for inspection and test, number of samples, accept or reject criteria.

d. Process witness samples shall be stored in controlled conditions.

5.5.3.2 Special processes

a. The supplier shall establish and implement procedures and controls for special processes, to ensure that:

1. Special processes are validated for the intended application.

NOTE Validation of special processes is defined in ECSS-Q-ST-70.

2. Personnel who perform special processes or evaluate the process performance are trained and certified or can demonstrate their proficiency through their regular activity.

3. Materials, equipment, computer systems and software, and procedures involved in the performance of the special process are validated and monitored.

4. Coordination is maintained with the cognizant engineering function to ensure proper selection of the non–destructive or destructive methods for the evaluation of process performance.

5.5.3.3 Statistical process control

a. Statistical methods for process control should be used for early detection of significant variations in manufacturing processes, in order to determine, analyse and eliminate the causes of undesirable variations.

5.5.4 Workmanship standards

a. The supplier shall employ workmanship standards throughout all phases of manufacturing, assembly and integration, to ensure acceptable and consistent workmanship quality levels.

b. Workmanship standards shall identify acceptance or rejection criteria.

c. Physical samples or visual aids shall be reviewed and agreed by the customer when they are used for the purpose of acceptance or rejection of items.

5.5.5 Materials and parts control

a. The supplier shall ensure that only conforming items are released and used, and that those not required for the operation involved are removed from work operation areas.

b. Items having limited–life or definite characteristics of quality degradation or drift with age or use shall be marked to indicate the dates, test times or cycles at which life was initiated and at which the useful life expires.

c. Sensitive items shall be processed or manufactured, inspected and tested in a controlled environment to prevent any degradation.

NOTE Requirements for the selection and control of materials and parts are defined in ECSS-Q-ST-70.

5.5.6 Equipment control

5.5.6.1 Tooling

a. The supplier shall make provisions for accountability, identification and maintenance of manufacture, assembly and integration tooling.

b. Manufacture, assembly and integration tooling shall be checked for its dimensional accuracy, regarding the product drawings, and correct function.

c. The QA organization shall approve tooling prior to use.

d. The approval shall be stamped in conformance with 5.2.4, and recorded.

e. Tools shall be checked for accuracy during the production life at adequate intervals.

f. Tools shall be submitted to re–approval following modification.

g. Tools shall be properly stored to prevent misuse, damage and deterioration.

h. Unnecessary tools shall be removed from working areas.

i. Records shall be kept of all manufacturing equipment.

5.5.6.2 Equipment for computer–aided manufacturing

a. The supplier shall ensure that computer–aided techniques and data for processing and machining are validated prior to use and controlled during their use in manufacturing.

b. The supplier shall ensure that provisions are made for the testing, approval and configuration control of the software involved and prevention of its being tampered with.

5.5.7 Cleanliness and contamination control

5.5.7.1 General

a. The supplier shall establish controls for cleanliness of spacecraft hardware and facilities, and the limitation of sources of contamination.

NOTE Cleanliness and contamination control methods and processes are detailed in ECSS-Q-ST-70-01.

5.5.7.2 Cleanliness levels

a. Contamination–sensitive items shall be cleaned, controlled and maintained to the required cleanliness levels.

b. The required cleanliness levels for all levels of flight hardware shall be indicated on drawings, specifications, procedures, or other documents controlling the manufacture, assembly, integration and test of the items.

5.5.7.3 Cleaning materials and methods

a. The supplier shall develop detailed methods for attaining the cleanliness levels specified for the hardware.

5.5.7.4 Contamination control

a. Contamination shall be minimized by operating in clean working areas and by proper handling, preservation, packaging and storage.

b. Contamination–sensitive items fabricated or processed in contamination–controlled environments shall be inspected, tested, modified or repaired in identical or cleaner environments, unless specific precautions are taken to protect the items concerned from contamination.

c. Specific protection measures, such as protective dust covers, shall be implemented to protect contamination–sensitive items when they are integrated in a higher level of assembly.

5.5.7.5 Cleanliness of facilities

a. Fabrication, assembly and integration of contamination sensitive items shall be conducted in facilities that provide cleanliness levels compatible with the specified product cleanliness.

5.5.8 Inspection

a. Inspection and tests shall be planned at the points of the manufacturing, assembly and integration flow where maximum assurance for correct processing and prevention of unrecoverable or costly nonconformances can be obtained.

b. All identified critical characteristics shall be inspected as defined in the critical-item control programme.

c. Self–inspection by the operators performing the associated manufacturing, assembly and integration activities shall not be considered sufficient for critical characteristics.

d. Among the inspections and tests as part of the manufacturing, assembly and integration flow, mandatory inspection points (MIPs) shall be performed with participation of the customer.

e. MIPs shall be agreed with the customer.

f. MIPs shall be selected in accordance with the criteria as defined below, when one or more of the following conditions apply:

   1. When maximum visibility of quality is given.

   2. When critical processes are performed.

   3. Where the next step of the manufacturing sequence:

      (a) is irreversible, or

      (b) makes the item difficult and costly to disassemble for inspection, or

      (c) renders the location inaccessible for inspection.

   4. When the item, once installed in the next higher assembly damages by its failure the higher assembly.

5. When previous failure history of the item indicates a need for inspection.

6. When a potential adverse impact on the properties and integrity of the end product could result, owing to the criticality or complexity of the manufacturing step.

7. When testing or critical inspections cannot be accomplished by the supplier.

   NOTE For example, environments or test equipment not available at supplier's facility.

8. When verification tests are destructive in nature and the quality cannot be verified solely by inspection or test at the supplier's facility.

9. When manufacturing and AIV of complex equipment or subsystems is planned.

   NOTE For example, for payloads.

10. When past performance or quality history of the lower level supplier is marginal.

11. When an item is going to final inspection.

g. Criteria 5.5.8f.7 to 10 shall be considered together with the criticality and complexity of the supplies and the supplier's experience with the lower level supplier.

h. A MIP shall require an invitation with the agreed notice before the event, and the participation of the customer, or their written agreement to proceed without their participation.

i. The supplier shall make provisions for a positive identification of the inspection and test status of any items at any stage of the manufacturing, assembly and integration cycle, starting from the incoming inspection up to shipping of the end item.

5.5.9 Specific requirements for assembly and integration

5.5.9.1 Control of temporary installations and removals

a. The supplier shall ensure the control of flight items which are temporarily removed or non–flight items which are temporarily installed to facilitate assembly, integration, testing, handling or preservation of the end item.

b. The control shall be initiated upon installation or removal of the first temporarily installed or removed item and be maintained through delivery and use of the end item.

c. The supplier shall establish and maintain records of temporary installations and removals.

d. Temporarily installed items shall be accounted for to prevent their being incorporated in the final flight configuration.

5.5.9.2 Logbooks

a. The supplier shall prepare and maintain system, subsystem and equipment logbooks in conformance with the DRD in Annex C for all operations and tests performed on the item during the period to be covered by the logbook.

b. Equipment logbooks shall start with the first qualification or acceptance test after assembly.

c. Subsystem and system logbooks shall follow–on from the individual equipment logbooks to form a full record.

d. The logbook shall accompany the hardware whenever it is placed in the custody of another organization

e. The receiving organization shall maintain the logbook up-to-date.

5.5.10 Manufacturing, assembly and integration records

a. The supplier shall establish and maintain manufacturing, assembly and integration records to provide all manufacturing, assembly, integration and inspection data required for traceability.

5.6 QA requirements for testing

5.6.1 Test facilities

a. The supplier shall ensure that test facilities, either internal or external, conform to specified requirements.

5.6.2 Test equipment

a. The supplier shall ensure that computer–aided testing techniques and data are validated prior to use and controlled during their use in testing.

b. The supplier shall ensure that provisions are made for testing, approval and configuration control of the software involved and prevention of its being tampered with.

c. The supplier shall ensure that test equipment are designed such that their correct operation can be verified without having to apply them to the test item.

5.6.3 Test documentation

5.6.3.1 Test procedures

a. The supplier shall ensure that tests are performed in accordance with documented procedures, which shall include, as a minimum:

1. scope of the test, including the identification of the requirement being verified,
2. identification of the test object,
3. applicable documents, with their revision status,
4. test flow,
5. test organization,
6. test conditions,
7. test equipment and set–up,
8. step–by–step procedure, including definition of specific steps to be witnessed by QA personnel,
9. recording of data,
10. pass or fail criteria and test data evaluation requirements, and
11. guidelines or criteria for deviation from test procedure and for retest.

b. The QA organization shall review and approve test procedures.

5.6.3.2 Test reports

a. The supplier shall ensure that all tests are comprehensively documented in test reports, and that they include, as a minimum:

1. reference to the applicable test procedure, and description of the deviations from it during the actual testing,
2. test data records and evaluation, and
3. summary of test results.

b. The QA organization shall review and approve test reports.

5.6.4 Test performance monitoring

a. On the basis of an analysis of the test plan, the QA organization shall define within the test plan the most appropriate way to monitor the performance of test activities, to ensure the adherence to the test procedures, and that any deviations are properly documented and treated.

b. Test witnessing by QA personnel shall be considered when manual intervention is performed, at the setting–up, start and end of continuous fully automated test sequences, or when no automatic recording of test parameters or results is available.

c. All testing activities related to critical characteristics as identified in the critical-items control programme shall be certified.

d. Self–certification by the operators performing the test activities shall not be considered sufficient for critical characteristics.

e. Testing activities or results to be subject to QA certification shall be identified as such in the relevant test procedure.

f. Testing shall be subject to the requirements for the control of hazardous operations.

NOTE Definition of hazardous operations is given in ECSS-Q-ST-40.

g. Where safety of personnel or damage to items or associated test equipment is possible, QA personnel shall have the authority to stop the test.

5.6.5 Test reviews

a. The supplier shall ensure that formal reviews are performed before and after major portions of qualification or acceptance tests.

b. The QA organization shall be represented in the formal boards established for the review of readiness for testing and testing accomplishment.

5.7 QA requirements for acceptance and delivery

5.7.1 Acceptance and delivery process

a. The supplier shall establish a formal acceptance process for all deliverable items, at any contractual level, to ensure that conformance of the items to be delivered is fully assessed and documented.

b. The supplier shall ensure that the preparation of the items for delivery and the physical delivery itself are performed in such a way that quality degradation is prevented.

5.7.2 End item data package

a. The supplier shall provide an EIDP for each deliverable end item in conformance with the DRD in Annex B.

b. The EIDP shall constitute the basis for formal acceptance reviews.

c. EIDPs shall be maintained and integrated into higher level EIDPs during subsystem or system integration and testing.

5.7.3 Delivery review board (DRB)

a. The supplier shall ensure that a DRB is convened prior to the delivery of equipment, separately assembled subsystems, test equipment or handling equipment for higher level activities.

NOTE "Acceptance Review Board" (ARB) defined in ECSS-M-ST-10 is referred to as "Delivery Review Board" (DRB) in this document.

b. The DRB functions at system level shall be fulfilled by the final acceptance review and chaired by the customer.

c. The DRB shall be composed, at least, of the following members:

1. Representatives of the receiving organization:
   (a) Project manager, or authorized representative, as chairman;
   (b) PA manager, or authorized representative;
   (c) Engineering or design manager, or authorized representative.
2. Submitting supplier's representatives:
   (a) Project manager, or authorized representative;
   (b) PA manager, or authorized representative;
   (c) Engineering or design manager, or authorized representative.
3. Higher level customers' representative(s), as observers (not required for separate subsystems).

d. If the final customer reserves the right to attend DRBs at any lower level as an observer, he shall be given due notice of such a DRB meeting.

e. The DRB shall be responsible for authorising the shipment of the items under acceptance, and certifying in writing that:

1. the items conform to the contractual requirements and to an approved design configuration;
2. the items are free from material and workmanship deficiencies;
3. all nonconformances are closed–out, or corresponding plans, compatible with the delivery, are accepted;
4. the relevant EIDP is complete and accurate.

f. Delivery shall only be authorized by the unanimous agreement of the DRB members.

g. For the delivery a certificate of conformity, in conformance with Annex D, shall be made available and signed by the supplier.

5.7.4 Preparation for delivery

5.7.4.1 Packaging

a. The supplier shall ensure that packaging materials, methods, procedures and instructions provide for protection of items while at the supplier's plant, during transportation, and after their arrival at destination.

5.7.4.2 Marking and labelling

a. The supplier shall ensure that appropriate marking and labelling for packaging, storage, transportation and shipping of items are performed in accordance with the applicable specifications.

5.7.5 Delivery

5.7.5.1 Shipping control

a. The supplier shall ensure that the items to be shipped from his plant are inspected before release and found to be complete, adequately preserved and packaged, correctly marked and accompanied by all the required documentation.

b. Accompanying documentation shall include the EIDP and, attached to the outside of the shipping container, the handling and packing or unpacking procedure and any relevant safety procedures.

5.7.5.2 Transportation

a. The supplier shall make provisions for the prevention of damage to items during transportation.

5.8 QA requirements for ground support equipment (GSE)

5.8.1 Development

5.8.1.1 Design quality requirements for GSE

5.8.1.1.1 Design and verification

a. The supplier shall ensure that internal design and verification standards are used or developed corresponding with the techniques to be used and fitting with the level of complexity of the items to be developed.

b. The supplier shall ensure that development risks are identified and appropriate back–up solutions are identified.

c. The supplier shall ensure that the verification method and process are tailored to the:

1. complexity of the item to be verified;
2. criticality of the function to be implemented by the GSE item;
3. inherent criticality of the item itself.

5.8.2 Configuration control

a. The supplier shall ensure that GSE is configuration controlled.

5.8.3 Production

5.8.3.1 Procurement

a. The supplier shall ensure that selected GSE suppliers have a demonstrated ability to conform to requirements, through:
   1. previous supply of items similar or more complex in the same field of techniques and technologies,
   2. certification covering similar design, development and production as applicable for similar items in conformance with 5.4.1.2, or
   3. evidence, documented by existing design, development, production and quality standards, of having similar experience associated with known success.

b. Procurement documents shall identify validation and receiving inspection requirements, and conform to the requirements in clause 5.4.2.

5.8.3.2 Manufacturing, assembly, integration and test

a. The supplier and his lower level suppliers should not deviate from their standard practices when these are already documented and recognized for similar items.

5.8.4 Delivery

5.8.4.1 End item data package

a. The acceptance data package shall include :
   1. information regarding interfaces,
   2. deviations from contractual requirements,
   3. certification of conformance to an identified baseline,
   4. description of the functioning of the item, and instructions to operate and maintain it, and
   5. safety data or safety certification(s).

5.8.5 Acceptance

a. Acceptance shall be achieved through a formal review process

NOTE Review process is defined in ECSS-M-ST-10-01.

b. The acceptance process shall include:

1. acceptance plan,
2. inspection and test procedures, and
3. inspection and test reports.

c. Acceptance may be achieved through a simple inspection process if agreed between customer and supplier.

5.8.6 Delivery board

a. The supplier shall propose GSE elements for which acceptance is granted by a delivery board and agree these with his customer.

b. The delivery board shall include QA representatives from the supplier and the customer.

5.8.7 Delivery

a. The requirements of the following clauses shall be applied to the delivery of ground items and handling, storage, packing and shipping activities:

1. preparation for delivery, in conformance with 5.7.4,
2. delivery, in conformance with 5.7.5, and
3. handling, storage and preservation, in conformance with 5.2.7.

5.8.8 General requirements

a. The following requirements shall be tailored in accordance with the complexity and criticality of the GSE item:

1. traceability requirements in 5.2.5, and
2. metrology and calibration requirements in 5.2.6.

5.8.9 Maintenance

a. The supplier shall ensure that maintenance activities are planned.

b. The supplier shall ensure that maintenance demonstration is performed in order to prove that maintainability requirements are satisfied in the real operational environment.

Annex A (normative)
QA plan - DRD

A.1 DRD identification

A.1.1 Requirement identification and source document

This DRD is called from ECSS-Q-ST-20, requirement 5.1.1a

A.1.2 Purpose and objective

The objective of the QA Plan is to describe the activities to be performed by the supplier to assure the quality of the product and to demonstrate compliance to the applicable quality assurance requirements.

A.2 Expected response

A.2.1 Scope and content

<1> Introduction

a. The Quality Assurance Plan shall introduce the purpose, objective and the reason prompting its preparation

<2> Applicable and reference documents

a. The Quality Assurance Plan shall list the applicable and reference documents in support of the generation of the document.

<3> Quality Assurance management

a. The Quality Assurance Plan shall describe the activities to be applied to fulfil the applicable quality assurance general requirements defined in ECSS-Q-ST-20 clause 5.1.

<4> QA requirements for design and verification

a. The Quality Assurance Plan shall describe the activities to be applied to fulfil the applicable Quality assurance requirements for design and verification defined in ECSS-Q-ST-20 clause 5.3.

<5> QA requirements for procurement

a. The Quality Assurance Plan shall describe the activities to be applied to fulfil the applicable Quality assurance requirements for procurement defined in ECSS-Q-ST-20 clause 5.4

<6> QA requirements for manufacturing, assembly and integration

a. The Quality Assurance Plan shall describe the activities to be applied to fulfil the applicable Quality assurance requirements for manufacturing, assembly and integration defined in ECSS-Q-ST-20 clause 5.5.

<7> QA requirements for Testing

a. The Quality Assurance Plan shall describe the activities to be applied to fulfil the applicable Quality assurance requirements for testing defined in ECSS-Q-ST-20 clause 5.6.

<8> QA requirements for acceptance and delivery

a. The Quality Assurance Plan shall describe the activities to be applied to fulfil the applicable Quality assurance requirements for acceptance and delivery defined in ECSS-Q-ST-20 clause 5.7.

A.2.2 Special remarks

a. The response to this DRD may be combined with the response to the product assurance plan, as defined in ECSS-Q-ST-10.

Annex B (normative)
End item data package (EIDP) - DRD

B.1 DRD identification

B.1.1 Requirement identification and source document

This DRD is called from ECSS-Q-ST-20, requirement 5.7.2a

B.1.2 Purpose and objective

The end item data package is the collection of the data related to the manufacturing, assembly, integration and test of a deliverable configuration item which provides the necessary traceability and events record.

The EIDP constitutes the basis to support the acceptance of the product.

The document is built from the beginning of the activity for all relevant verification levels (i.e. MIP, TRR or TRB).

It is used to perform the TRB or DRB with the customer during the acceptance review of deliverable hardware.

B.2 Expected response

B.2.1 Scope and content

a. The EIDP shall include the following information and documentation:

1. The DRB minutes
2. The customer acceptance certificate if not covered in DRB minutes
3. Cover page

   NOTE An example is given in Annex F.
4. Table of contents

   NOTE An example is given in Annex G.
5. Change record

6. The product certificate of conformity in conformance with Annex D.
7. NCR list
8. ABCL
9. Summary and status of RFDs and RFWs raised and processed on the product
10. The product logbook
11. Product definition documents to be used for further integration, testing and operation in higher level assemblies including the software used to operate the item and the product user or operating manuals.
12. Procedures to be used for the proper handling of the product after its final delivery, including procedures for:
    (a) packing,
    (b) handling,
    (c) storage,
    (d) transportation,
    (e) safety, and
    (f) cleanliness.
13. Copies of the product test reports, or as a minimum the list of the documents with the identification of their location.
14. List of delivered ground support equipment (e.g.: MGSE, EGSE, FGSE, OGSE) with the reference to their corresponding EIDPs and software product.
15. List of EIDPs or logbooks of units and subsystem supplied by lower tier suppliers.
16. List of the loose items and not installed items supplied with the product.
17. Any additional useful information or data relevant to the product.

NOTE For example, cleanliness certification when cleanliness is a requirement.

B.2.2 Special remarks

None.

Annex C (normative)
Logbook - DRD

C.1 DRD identification

C.1.1 Requirement identification and source document

This DRD is called from ECSS-Q-ST-20C, requirement 5.5.9.2a.

C.1.2 Purpose and objective

The logbook is the document in which the data related to the integration and testing of a configuration item are recorded in chronological order to provide the necessary events traceability at any time during the programme life cycle, beginning with the first qualification or acceptance test. It is part of the EIDP (see Annex B).

C.2 Expected response

C.2.1 Scope and content

a. The logbook cover page shall contain the following:

   1. general information,
   2. contents,
   3. approvals of the relevant authorities (QA, PA, PM), and
   4. customer acceptance (if required by the business agreement).

   NOTE An example of a logbook cover page is given in Annex E.

b. The logbook shall contain the "hardware configuration and traceability" table, which reports all the identification references of single elements composing the CI.

c. The logbook shall contain the "hardware configuration change and status" table, which reports for each singe element of the CI all the events relevant to integration, removal and replacement on the higher level.

d. The logbook shall contain the summary list of the integration and test instructions, including for each entry, the action start date, action performed date and action close–out date shall also be reported.

NOTE Example: shop traveller

e. The logbook shall contain the summary list of nonconformances with relevant identification references, issue date, closure dates, and status.

f. The logbook shall contain all the electrical connector (or other limited cycles items) mate and demate cycles in order to ensure the conformance with the project requirements.

g. The logbook shall contain the records of total operating hours for each limited–life element identified in the test procedures.

h. The logbook shall contain, in chronological order, the events related to the integration and test activities performed on the relevant item (i.e. system, subsystem, and equipment), including the following:

1. Action requested form, reporting all the operations performed with the references to the applicable documents or procedures, start date, completion date and quality inspection stamps.
2. Step-by-step procedures and results, in which copies of the as–run procedures are included in a suitable format.
3. Procedures variation form, in which copies of modified procedures (red marked) identified with a procedure variation number and duly approved by responsible authorities, are included.

i. The logbook shall contain the list of open action or open test at the time of the product shipment to the customer, test facility or launch pad.

C.2.2 Special remarks

An example of a logbook cover page is given in Annex E.

Annex D (normative)
Certificate of conformity (DoC) - DRD

D.1 DRD identification

D.1.1 Requirement identification and source document

This DRD is called from ECSS-Q-ST-20C, requirement 5.7.3g.

NOTE See also Annex B.2.1a.6.

D.1.2 Purpose and objective

The certificate of conformity is the document that declares the conformance of an end item in all respect with the applicable specification(s), drawing(s) and requirements of the order.

This document is included in the EIDP to provide to the customer the assurance that the deliverable item has been designed, manufactured and tested in accordance with the technical and quality requirements established by the business agreement and the statement of work.

D.2 Expected response

D.2.1 Content

a. The DoC shall contain the following elements:

1. Title including references to identify the product and the relevant applicable documents

   NOTE Examples for references are item name, project, serial number, part number, customer, contract number.

2. Document no. in accordance with project configuration control rules;
3. EIDP reference number;
4. Intended use, specifying the item objective (i.e. BB, QM, FM)

5. Reference of conformity, calling for example the following documents:
   (a) Business agreement requirements: reference number of design spec., ICD or other contractual documents;
   (b) Operational documents: reference number of drawings, procedures, and electrical schemes;
   (c) Deliverable documents: reference number of EIDP, logbooks, and manuals.
6. Statement of conformity.
7. List of waivers or deviations or other remarks.

D.2.2 Special remarks

An example of a DoC is given in Annex H.

Annex E (informative)
Example of a logbook cover page

<table>
<tr><td colspan="3">Logbook
General information</td><td>Log No.
Model
Sheet 1 of 1</td></tr>
<tr><td>Program</td><td>Item name</td><td>Item part no.</td><td>Item serial no.</td></tr>
<tr><td>Customer</td><td>Contract no.</td><td>Log start date</td><td>Log finish date</td></tr>
<tr><td colspan="4">Contents:
Section 1 Hardware configuration and traceability — Total Sheets
Section 2 Hardware configuration change and status — ″ ″
Section 3 Shop traveller list (or similar documents) — ″ ″
Section 4 Nonconformances summary list — ″ ″
Section 5 Connectors mate and demate — ″ ″
Section 6 Operating hours log — ″ ″
Section 7 Log of actions — ″ ″
Section 7.1 Action requested — ″ ″
Section 7.2 Additional actions undertaken — ″ ″
Section 7.3 Step by step procedure and results — ″ ″
Section 8 Open works — ″ ″</td></tr>
<tr><td colspan="2">Date system quality assurance approval:</td><td colspan="2"></td></tr>
<tr><td colspan="2">Date programme manager acceptance:</td><td colspan="2">Date PA manager acceptance:</td></tr>
<tr><td colspan="4">Customer acceptance:

Date: _____ Customer signature _____</td></tr>
</table>

Annex F (informative)
Example of EIDP cover page

		EIDP no.
End item data package		
Item description	**Specification no.**	
Drawing or identification no.	**Serial no.**	**Model**
CI no.	**Contract no.**	
Prepared by:	**Dept.:**	**Date:**
Approved by:	**Dept.:**	**Date:**

Annex G (informative)
Example of EIDP contents

EIDP contents			EIDP no.	
		Included	**Vol. no.**	**Remarks**
Section 1	**Customer follow–up sheet, DRB minutes, customer acceptance certificate if not covered by DRB minutes**			
Section 2	**EIDP front sheet and contents**			
Section 3	**EIDP change record**			
Section 4	**Certificate of conformity**			
Section 5	**As–design as–built configuration status**			
Section 6	**Request for waivers and NCR list (NCR, RFW or RFD) summary**			
Section 7	**Operation documentation** • **Interface drawings** • **User or operating manuals** • **Operational S/W list**			
Section 8	**Logbook**			
Section 9	**Procedures for e.g. packing, handling, storage, transportation, safety, and cleanliness.**			
Section 10	**Test report**			
Section 11	**Ground support equipment (GSE) and S/W product list**			
Section 12	**EIDPs or logbooks list (SBCOs H/W, GSE)**			
Section 13	**Loose item list (not installed items and spares)**			
Section 14	**Other data and remarks**			

Annex H (informative)
Example of Certificate of conformity

Certificate of conformity					
Document no.		**Project**		**Log**	
Item name	**Item part no.**		**Item serial no.**		**Customer code**
Customer		**Contract no.**		**Intended use**	
Reference of conformity					
Contract requirements		**Operational documents**		**Deliverable documents**	
Document no.	**Issue/rev.**	**Document no.**	**Issue/rev.**	**Document no.**	**Issue/rev.**
Statement of conformity					

It is hereby certified that apart from the deviations or waivers noted in the "Remarks" box below, the whole of the supplies detailed above, conform in all respects to the specification(s), drawing(s) and condition(s) or requirement(s) respects to the specification(s), drawing(s) and condition(s) or requirement(s) of the contract.

Remarks:

PA manager: _____ **Date:** _____

Annex I (informative)
QA document requirement list

Table I-1 presents the reviews at which the different issues of the Quality Assurance documents are expected.

Table I-1: QA document requirement list with respect to milestones

Document Title	Phase												DRD Ref.
	0	A	B		C	D		E					
	MDR	PRR	SRR	PDR	CDR	QR	AR	ORR	FRR	LRR	CRR	ELR	
Quality Assurance Plan		X	X	X	X								ECSS-Q-ST-20C Annex A
EIDP							X						ECSS-Q-ST-20C Annex B
Note: EIDP includes logbook (Annex C) and certificate of conformity (Annex D)													

Bibliography

ECSS-S-ST-00	ECSS system — Description, implementation and general requirements
ECSS-E-ST-10-02	Space engineering — Verification
ECSS-M-ST-10	Space project management – Project planning and implementation
ECSS-M-ST-10-01	Space project management – Organization and conduct of reviews
ECSS-M-ST-40	Space project management – Configuration and information management
ECSS-Q-ST-30	Space product assurance — Dependability
ECSS-Q-ST-40	Space product assurance — Safety
ECSS-Q-ST-60	Space product assurance — Electrical, electronic and electromechanical (EEE) components
ECSS-Q-ST-70	Space product assurance — Materials, mechanical parts and processes
ECSS-Q-ST-70-01	Space product assurance – Cleanliness and contamination control