



QUALITY ASSURANCE PROGRAM STANDARD (Basic Requirements: JIS Q 9100)

January 18, 2018

Japan Aerospace Exploration Agency

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This is an English translation of JMR-013 Revision A.

If there is anything ambiguous in this document, the original document (the Japanese version) shall be used for clarification.

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JMR-013 Revision A
QUALITY ASSURANCE PROGRAM STANDARD
(BASIC REQUIREMENTS: JIS Q 9100)

1. JAXA JMR-013 Revision A is hereby established.
2. For any questions concerning this standard, contact the Safety and Mission Assurance Department of the Japan Aerospace Exploration Agency (JAXA).

Establishment: Safety and Mission Assurance Department Director

January 18, 2018

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1. General

1.1 Purpose

This quality assurance program standard (hereinafter referred to as the "standard") specifies the requirements for the quality assurance program that is planned and implemented by the contractor in accordance with the contract for a launch vehicle and spacecraft developed and fabricated by the Japan Aerospace Exploration Agency (hereinafter referred to as "JAXA"). This standard consists of basic requirements (JIS Q 9100) and JAXA-specific requirements.

JIS Q 9100 is the quality systems aerospace model for quality assurance in design, development, production, installation and servicing. All three standards, JIS Q 9100 / EN9100 / AS9100, are based on IAQG 9100, which is a standard established by the International Aerospace Quality Group (IAQG). AS9100 is mainly used in the United States, EN 9100 in Europe, and JIS Q 9100 in Japan. Since the technical contents of these standards are compatible, international mutual certification is possible, and even if the certification of any standard is acquired, it is recognized as equivalent in the world.

Since quality assurance activities, which are implemented by the contractor in accordance with the contract concerning design, fabrication and test of a launch vehicle and spacecraft, are indispensable for mission success, JAXA requires quality assurance activities of the contractor in accordance with this standard.

1.2 Scope

1.2.1 Application

This standard shall be applicable when any of the following apply:

- (1) This standard is referred to in a contract or in procurement specifications.
- (2) The contractor proposes to apply this standard to a quality assurance program, and when it is approved by JAXA.
- (3) This standard is referred to in JAXA requests for proposals.

1.2.2 Relation to other contract requirements

The relation between this standard and other contract requirement shall be as follows:

- (1) If a conflict exists between the requirements of this document and those stated in a contract or procurement specifications, the latter documents shall take precedence.
- (2) This standard does not require a duplication of tasks for other program requirements in a contract, but is to complement them.

1.2.3 Tailoring

- (1) This standard may be tailored on a contractual basis according to the purpose, function, importance, or costs of target articles.
- (2) The contractor may propose appropriate tailoring during contractual negotiation process. Considering factors related to purpose, function, importance and costs of target articles, the contractor shall offer a proposal for tailoring and the proposal shall be approved by JAXA.

1.3 Normative references

1.3.1 Applicable documents

The following documents constitute a part of this standard within the scope defined by this standard. Unless otherwise specified, the latest version at the conclusion of the contract applies. As for (1), the edition, which the contractor acquires third-party certification, shall be applied.

- (1) JIS Q 9100 Quality Management Systems – Requirements for Aviation, Space and Defense Organizations
- (2) Notification No. 16-1 from the Managers of the Safety and Mission Assurance Department and the Contract Department, Inspection implementation Procedure (*)
- (3) JMR-004 Reliability Program Standard (*)
- (4) JMR-006 Configuration Management Standard
- (5) CQM-103003 Procedure for Preparing a Report Concerning the Prevention of the Recurrence of Serious Quality Problems (*)

1.3.2 References

The following documents are references for this standard.

- (1) JERG-0-050 Quality Improvement Guideline for Imported Parts in Satellite Development
- (2) JERG-0-051 Quality Improvement Guideline for Imported Components in Satellite Development
- (3) JERG-0-018 Handbook for Method of Human Factors Analysis*
- (4) JERG-0-020 Handbook for Method of “Quality Hiyari-Hatto” Data Application*
(*) Document available only in Japanese.

1.4 Glossary of terms

Appendix-1 shows the “Glossary of Terms” defines terms utilized in this standard.

1.5 JAXA actions and prerogatives

1.5.1 Surveillance and source inspection by JAXA

The contractor shall ensure to receive the surveillance and source inspection by JAXA (including pre-shipment reviews) for confirming the contract implementation status including examining the following:

- (1) If the contractor management system meets the contract requirements.
- (2) If the product satisfies the quality requirements, and complies with the contract requirements.

The quality surveillance and source inspection shall be performed by representatives or assistant representatives (hereinafter called JAXA representatives) appointed according to Notification No. 16-1 from the Managers of the Safety and Mission Assurance Department and the Contract Department.

These surveillance and source inspection shall also apply to the suppliers of the contractor.

The contractor shall coordinate with JAXA representatives and identify articles to be inspected and subcontracted articles subject to source inspection by JAXA representative.

1.5.2 Support to JAXA representatives

The contractor shall provide the following support to the JAXA representative's activities and ensure the safety for performing their duties:

- (1) Present necessary documents, data and records
- (2) Prepare inspection equipment, samples and materials
- (3) Provide appropriate facilities

2. Quality assurance program management and planning

The contractor shall establish and implement a quality assurance program, which satisfies the requirements of this standard, to assure that the end item satisfies the quality requirements of the contract.

2.1 Basic requirements

Quality assurance program of the contractor shall be in accordance with quality management system which the contractor acquired third-party certification based on JIS Q 9100.

2.2 JAXA-specific requirements

The contractor shall satisfy JAXA-specific requirements specified in paragraphs 2.2.1 to 2.2.91 of this standard. The contractor shall adopt JIS Q 9100-based quality management system effectively and efficiently to implement the JAXA-specific requirements. When tailoring of JAXA-specific requirements is conducted according to paragraph 1.2.3 of this standard, the tailoring shall take precedence.

2.2.1 Quality assurance program

2.2.1.1 Establishment, maintenance and approval of quality assurance program plan

The contractor shall establish quality assurance program plan, which describes the implementation of the quality assurance program according to the requirements of this standard, as required for each contract and obtain approval from the adequate organization in charge in JAXA. When the contractor generates standard quality assurance program documented as the Standard Quality Assurance Program Plan according to the requirements of this standard, and set an individual quality assurance program plan for each contract, the Standard Quality Assurance Program Plan shall be submitted to and approved by JAXA Safety and Mission Assurance Department.

The contractor shall re-submit the quality assurance program plan to JAXA where any change is made in the content of the quality assurance program plan, and is required to obtain re-approval whenever JAXA judges it to be important.

2.2.1.2 Contents of the quality assurance program plan

The contractor shall describe at least the following items in the quality assurance program plan and the format of the plan shall be easily identified with each JAXA-specific requirement in this standard.

The contractor shall refer to Appendix-2, "Quality assurance program documents specifically required by JAXA other than the documents required by JIS Q 9100" and Appendix-3, "Quality records specifically required by JAXA other than the records required by JIS Q 9100" concerning quality assurance program documents and quality records.

- (1) Title, document number, certification number, handling notice of quality manual to implement basic requirements in paragraph 2.1 of this standard.
- (2) A description concerning all organizations involved with JAXA-specific requirements and their functions and responsibilities.

- (3) Descriptions of when, by which organization, and by which methods each task relating to JAXA-specific requirements will be executed and how each task is managed.
- (4) Lists showing the relationship of each task with quality assurance program documents, including internal documents or regulations that are applied for JAXA-specific requirements.
- (5) Identification in the quality assurance program documents list specified in (4) of the documents that utilize existing quality assurance program documents, require changes, or require that new documents be prepared.
- (6) Lists of quality records.
- (7) Identification of tasks that duplicate or complement other program requirements in the contract, as well as details of these tasks.

2.2.1.3 Submitting quality assurance program documents

The contractor shall submit the quality assurance program documents, in accordance with the following criteria specified in the contract, for the approval, review and notification categories. Appendix-4 shows the documents to be submitted.

- (1) Approval: Documents need JAXA approval prior to application, based on the contract.
- (2) Review: Documents need JAXA evaluation prior to application, based on the contract.
- (3) Notification: Documents received by JAXA based on the contract.

The contractor shall submit quality manual based on JIS Q 9100 to JAXA Safety and Mission Assurance Department.

The contractor shall notify JAXA Safety and Mission Assurance Department of any change in the quality manual.

When the contractor is unable to submit quality manual to JAXA for the contractor's reasons, the contractor shall coordinate with JAXA and follow JAXA's instructions. Even if the contractor is unable to submit quality manual to JAXA, the contractor shall present the quality manual to JAXA.

2.2.2 Identification control and traceability

The contractor shall control identification and ensure traceability.

2.2.3 Design and development

2.2.3.1 Responsibilities of quality assurance department at reviews

2.2.3.1.1 Design review

The quality assurance department of the contractor shall evaluate the following to ensure that the design and development are verified and/or validated at the design reviews to be conducted in accordance with JMR-004, "Reliability Program Standard".

- (1) Requirements regarding the characteristics required for the various processes to include procurement, fabrication, inspection, and testing. The requirements and the standards, criteria, and specifications applied to these processes are specified, and their contents are deemed appropriate.
- (2) Inspection and test plans are appropriate with respect to quality assurance, and acceptance criteria are clear.
- (3) Workability and testability of the product, and reproducibility of manufacturing are considered.
- (4) Identification control requirements are appropriate.
- (5) Quality assurance requirements in the interface control documents are appropriate.
- (6) Applicable actions of previous nonconformance are reflected.
- (7) Documents required for a quality assurance program are prepared and maintained.

2.2.3.1.2 Post-qualification-test review

The quality assurance department of the contractor shall evaluate the following to ensure that the design and development are verified and/or validated and that the fabrication processes are verified at the post-qualification-test reviews (including post-prototype-flight-test reviews) to be conducted in accordance with the reliability program requirements.

- (1) Qualification test results are accurately recorded, and technical assessments are conducted.
- (2) All requirements for qualification are satisfied.
- (3) Changes in design and fabrication processes initiated after critical design are validated.
- (4) Any nonconformance is processed according to paragraph 2.2.6 of this standard, and re-testing is confirmed to be unnecessary.

2.2.3.1.3 Pre-shipment review

The quality assurance department of the contractor shall evaluate the following to ensure that end items are able to be delivered to JAXA at pre-shipment reviews.

- (1) Acceptance test (AT) results are accurately recorded, and technical assessments are conducted.
- (2) All quality records are maintained and managed.
- (3) All quality related requirements in the contract are satisfied.
- (4) All nonconformance actions are completed.
- (5) Documentation Data package are completed.
- (6) All changes in design and fabrication processes initiated after completion of qualification tests are validated, and such changes are incorporated in the related documents.

2.2.3.2 Use of previously developed articles

The contractor shall verify the quality assurance program applied to the fabrication of the previously developed articles and prove that the use of the previously developed articles does not have a problem when the contractor proposing the use of articles procured or fabricated for which the qualification test and development have been completed; i.e. the contractor shall prove the article are developed and manufactured under the quality assurance program equivalent level of the requirements in this standard.

2.2.3.3 Change control

2.2.3.3.1 Change control system

The contractor shall establish and maintain a system that controls changes in design, fabrication processes, inspection methods, and test methods.

- (1) Change control shall be coordinated with the control system based on JMR-006, "Configuration Management Standard", including reporting to, and obtaining approval from, JAXA, and shall be effectively executed.
- (2) Changes that involve interface relationships or affect articles not under the design control of the contractor shall be coordinated with the affected parties. The contractor shall obtain the agreement of the affected parties with the proper documentation.

2.2.3.4 Qualification tests

2.2.3.4.1 Control of qualification test articles

When the contract requires qualification tests (include proto-flight test), the contractor shall control articles subject to qualification testing according to the following:

- (1) Qualification test articles shall pass the tests to ensure that they can withstand in an environment more severe than actual flight or operational use (hereinafter referred to as "actual flight or operational use") In the proto flight test, the contractor shall pay enough consideration so as not to give an excessive load which affects the function, performance, life, etc.
- (2) Qualification test articles shall be identified so they may be distinguished from identical articles for actual flight or operational use.
- (3) Qualification test articles shall be representative of the articles for actual flight or operational use that are generally fabricated according to the same processes and using the same configuration.
- (4) Qualification test articles shall be selected as randomly as possible.
- (5) The results of the qualification tested articles shall be recorded after testing. Such articles shall not be used for actual flight or operational use, except obtaining special approval of JAXA by technical evaluation or refurbishment.

2.2.3.4.2 Re-qualification tests

The contractor shall conduct re-qualification tests when the contractor determines that it falls under any of the following items and re-qualification is necessary;

- At changes of the design, fabrication process, inspection method, test method of the qualified articles, or the procurement source.
- Articles have repeated non-conformance
- The result of anomaly, inspection, test, and actual flight or operational use indicates the need for re-qualification.

When one of the above conditions occurs, the contractor shall conduct the following:

- (1) Provide JAXA with written notification of the changes requested.
- (2) Specify the need for and extent of the re-qualification test.
- (3) Obtain approval of the JAXA representatives when conducting re-qualification tests.

2.2.3.4.3 Qualification based on similarity

The contractor may request JAXA approval for similar articles outside the scope of the corresponding contract that have been subjected to qualification testing based on their similar uses and utility. In such cases, the contractor shall ensure that the similarity between the articles is established and that the articles have undergone environmental testing resulting in similar, levels, times, and operating conditions at least as stringently as qualification levels required for the articles under the applicable contract.

2.2.3.4.4 Reports for qualification tests

The contractor shall prepare reports for every test (including qualification test, proto-flight test, and acceptance test [AT]) according to the contractual requirements (including following items (1) ~ (7)).

- (1) Nomenclature and identification number of articles
- (2) Nomenclature and identification number of the articles removed or replaced during testing
- (3) Copies of approved deviations or waivers
- (4) Summary of test data and results
- (5) Historical log of nonconformance
- (6) List of critical items and articles with operating life
- (7) Cumulative operating time or cycle data for articles

2.2.3.4.5 Confirmation before and after tests

Prior to and subsequent to qualification testing, proto-flight testing, acceptance testing (AT) and/or post-launch-site-delivery-testing, the contractor shall define items to be confirmed at task briefing, which is held to confirm that preparation activities for the testing are completed, and at task review, which is held to confirm the test results after completion of the testing. The contractor shall confirm the items.

2.2.4 Procurement controls

2.2.4.1 Purchasing of imported parts and components

The contractor shall conduct purchasing activities at each stage, including the selection, setting of technical specifications and procurements requirements, the review meeting, the witnessing of manufacturing, and the receiving inspection, with respect to imported parts and components, while referring to JERG-0-050, "Quality Improvement Guideline for Imported Parts in Satellite Development"

and JERG-0-051, "Quality Improvement Guideline for Imported Components in Satellite Development".

2.2.5 Fabrication controls

2.2.5.1 Process quality evaluation

The contractor shall compare the important quality characteristics and important processing parameters of the critical items required by JMR-004, "Reliability Program Standard", with previous similar items (including engineering models) prior to proceeding to the subsequent processes. If there is a discrepancy or change in the data that is deemed to be an anomaly, the departments of the contractor, including the engineering department, shall decide the disposition.

2.2.5.2 Special process controls

The contractor shall control the special process. This standard does not specify the special process, but it generally includes heat treating, welding, bonding, soldering, surface finishing, non-destructive inspection, chemical processing and so on.

2.2.5.3 Operation life limitation article and material controls

The contractor shall display, record, and maintain the time or cycles required to control the operational life for all articles and materials with definite quality degradation characteristics or characteristic changes with age or use.

2.2.5.4 Cleanliness control

The contractor shall control the fabrication, inspection and test areas in accordance with documented cleanliness requirements for environments, handling, workbenches, tools, and storage containers, and devices or equipment to prevent the contamination of materials.

2.2.5.5 Electrostatic discharge controls

The contractor shall establish and comply with the standards for electrostatic discharge controls for electric parts susceptible to electrostatic discharge and assemblies or devices containing such parts.

2.2.5.6 Control of temporary installed items

The contractor shall control the articles temporarily installed in hardware under fabrication (hereinafter referred to as "temporary installation") based on the following items:

- (1) Temporary installations shall be clearly identified.
- (2) Installation and removal of temporary installations shall be recorded in the fabrication records.

2.2.5.7 Establishing and maintaining fabrication processes

The contractor shall establish and maintain the fabrication processes according to the following procedures:

- (1) The completion of a Critical Design Review (CDR) and matters necessary to take proper measures for the CDR shall be the baseline of change management to establish and maintain the fabrication processes.
- (2) The contractor shall confirm in a Post-Qualification-Test Review (PQR) or an equivalent review that the fabrication process has been verified. The confirmation shall constitute the establishment of the authorized fabrication process.
- (3) Flight hardware shall be fabricated according to the fabrication instruction document for the established fabrication process. Even if a partial change after completion of qualification of fabrication process is made, re-qualification of fabrication process shall be conducted. If there is only a minor change applied, and it shows that the quality of the higher-level products subsequent processes is not clearly affected by the demonstration test or analysis, re-qualification of fabrication process may be exempted by providing sufficient technical basis.

2.2.5.8 Performing the inspections and tests

The contractor shall conduct inspections and testing according to test specifications, inspection procedures, and other technical documents. The inspections and testing shall be performed on procured and fabricated articles prior to their installation into the next higher level of assembly. The inspections and testing shall also include a review of the inspection and test records. The contractor shall keep records to ensure that each inspection or test is traceable to the individual responsible persons for its completion.

2.2.6 Nonconformance control

2.2.6.1 General

The contractor shall establish and maintain a documented nonconformance processing system to identify and isolate nonconforming articles, disposing of them properly. The system will ensure that corrective actions (hereinafter referred to as "actions") are taken when the articles do not comply with the requirements specified in the applicable drawings and specifications and when the article's performance is questionable (or in an error condition). This system shall be coordinated with the problem/failure requirements specified in JMR-004, "Reliability Program Standard".

Appendix-5, "Dispositions of the nonconforming articles" defines the actions of the nonconforming articles.

Prior to determining the actions of nonconforming articles, the contractor shall determine the causes and mechanism for nonconformance as necessary, properly evaluate the level of potential effects, and investigate or analyze the articles to determine the most effective solution.

When nonconformance occurs that will seriously affect the development schedule, costs, or interface, the contractor shall perform the root cause analysis using Appendix-6, "Root Cause Analysis of nonconformance" as reference.

2.2.6.2 Documentation of nonconformance

The contractor shall document all nonconformance. The documentation concerning nonconformance shall state the following items as a minimum:

- (1) Nomenclature and identification number of the nonconforming articles
- (2) Date and process in which nonconformance is detected.
- (3) Nonconformance descriptions and acceptance and rejection criteria.
- (4) Cause of nonconformance.
- (5) Description of nonconformance actions
- (6) Distinctions between the Preliminary Reviews (PRs) and Material Review Board (MRB)
- (7) Descriptions of corrective actions
- (8) Names of persons who recorded the descriptions indicated above and signature of the designated board members and date

2.2.6.3 Preliminary Reviews (PRs)

The designated board member of the contractor's quality assurance department and the designated board member of the contractor's engineering department responsible for designing the nonconforming article shall review the nonconforming article, selecting one of the following action methods after consulting with each other. They shall also confer with the fabrication, procurement, and other associated departments as necessary. When technical evaluation is unnecessary for minor rework, scrap and returning to suppliers at receiving inspections, reviews by the designated board member of the contractor's engineering department may be exempted. When the cause of the nonconformance is clearly supplier's fault, the nonconforming articles may be returned to suppliers by designated board member even if the nonconformance occurs after receiving inspections.

- (1) Rework
- (2) Repair
- (3) Scrap
- (4) Use-As-Is
- (5) Return to suppliers
- (6) Submission to MRB: When nonconformance action is inappropriate to be determined at PRs, the nonconforming article or material shall be submitted to MRB for final action.

2.2.6.4 Review by JAXA representatives

Records of nonconformance action which was determined at preliminary reviews shall be reviewed by JAXA representatives when required.

2.2.6.5 Material Review Board (MRB)

2.2.6.5.1 Membership

The Material Review Board (MRB) shall be comprised of at least a representative of the contractor's quality assurance department, a representative of the contractor's engineering department, which is responsible for design of nonconforming articles, and a JAXA representative. Each member may designate one or more agents. The board members of the contractor and their agents shall possess the authority and technical expertise adequate to determine actions. The board members of the contractor and their agents shall be approved by JAXA representatives. When determining the actions, opinions of associated departments of the contractor shall be referenced.

2.2.6.5.2 Responsibility

The Material Review Board (MRB) shall perform the following:

- (1) Determine the actions of the nonconforming articles or materials based on the results of adequate analysis and investigation. And confirm that proper actions have been implemented according to the decisions made.
- (2) Ensure that appropriate and effective corrective actions are documented on the nonconformance document.
- (3) Submit the application to JAXA for nonconformance actions requiring JAXA approval according to paragraph 2.2.6.6 of this standard and verify their implementation after JAXA approval is obtained.
- (4) Ensure that MRB decisions are recorded.

2.2.6.5.3 Action determination by MRB

The MRB shall select one of the following for action of nonconforming articles or materials submitted to it.

Concurrence of all board members is required to select any disposition other than scrap. The MRB shall consider the effects of the nonconformance regarding the purposes of article usage, check the record of disposition on previous nonconformance applied to identical articles, and consider the opinions of experts when determining dispositions.

- (1) Rework
- (2) Repair
- (3) Scrap
- (4) Use-As-Is
- (5) Return to suppliers
- (6) Recommendation to JAXA: If use-as-is or repair is recommended as a disposition of the nonconforming articles or materials that affects its function, performance, safety, reliability or etc. and it is not appropriate for the MRB to judge, the contractor shall submit the recommendation to JAXA according to paragraph 2.2.6.6 of this standard.

2.2.6.6 Application to JAXA

The contractor shall apply to JAXA for a waiver in accordance with JMR-006, "Configuration Management Standard", where applicable to paragraph 2.2.6.5.3 (6) of this standard. The application shall include application details, reasons and the MRB's recommendations, and shall be approved by JAXA through MRB.

2.2.6.7 Confirmation on action implementation

The contractor's quality assurance department shall confirm that the actions of the nonconforming articles or materials shall be implemented as determined in the preliminary reviews and the MRB.

2.2.6.8 Corrective actions

Considering the severity and the affected area of the nonconformance, the contractor shall organizationally notify or report to associated organizations who may implement the same corrective action. The contractor shall also make confirmation of corrective action implementation.

2.2.6.9 Measures to prevent the recurrence of serious quality problems

If a serious quality problem occurs, the contractor shall immediately prepare a report concerning the prevention of the recurrence of serious quality problems, obtain the signature of the person responsible for the quality system, and submit it to the Safety and Mission Assurance Department of JAXA, according to CQM-103003, "Procedure for Preparing a Report Concerning the Prevention of the Recurrence of Serious Quality Problems".

2.2.6.10 Material Review Board at supplier

The contractor may, with approval of JAXA representative, delegate the MRB responsibility for the applicable articles or materials to suppliers. In such a case, the contractor shall review and confirm the MRB results at the supplier's MRB as part of the procurement control.

2.2.7 Utilization of data

2.2.7.1 Utilization of JAXA database

The contractor shall submit the following nonconformance data for input into the electronic database system designated by JAXA. The contractor shall also utilize the JAXA database for nonconformance control at facilities.

- (1) Major nonconformance at the development and production phases shall be reported to the Critical Design Review.
- (2) Nonconformance submitted to MRB

2.2.7.2 Utilization of "QUALITY HIYARI-HATTO" data

When a QUALITY HIYARI-HATTO event occurs, the contractor shall collect, analyze, and use QUALITY HIYARI-HATTO data to prevent nonconformance. To

do so, the contractor may refer to JERG-0-020, "HANDBOOK FOR METHOD OF "QUALITY HIYARI-HATTO" DATA APPLICATION".

The contractor shall report regularly or as necessary concerning QUALITY HIYARI-HATTO events that may seriously affect the development schedule, costs, or interface when ordered by JAXA representative.

If an approach equivalent to those described in this handbook or a superior approach is available, it may be used. In that case, too, the contractor shall report to JAXA representative as described above.

2.2.8 History management of articles and document packaging

2.2.8.1 Records of articles

The contractor shall prepare and maintain the records of each article to be delivered in order to control the history of the articles. Each record shall identify the pertinent articles and be prepared starting from the lowest level of assembly, and recording the sequence of fabrication, inspection, and test operations, as well as storage and transportation, as well as identify the recorder and his/her post. The record shall either include the following or reference other documents:

(1) As-designed configuration data

Baseline configuration, approved changes, and deviations

(2) As-built configuration data

Parts list, drawings, specifications, changes, deviations, waivers, and identification data

(3) Fabrication history

Assembly and disassembly instructions and histories of coordination, repair, rework, or exchange

(4) Inspections and test records

Specifications, procedures, results, and variables data

(5) Nonconformance records

Nonconformance descriptions and actions

(6) Cumulative operating time or cycles

Operating time or cycles of tests and storage duration

2.2.8.2 Documentation data package

When submission of the documentation data package with shipment is specified in the contract, the contractor shall attach the data including component list, equipment log, or nonconformance historical log, as well as necessary documents for identification, maintenance, corrosion prevention and handling of the articles

to be shipped. The documentation data package shall include the historical logs of the items whose records are particularly effective for quality assurance, in addition to those of the items identified as reliability control items according to JMR-004, "Reliability Program Standard". The contractor shall coordinate with JAXA representative beforehand and determine the items to include the historical logs in the documentation data package. The packages or containers for storing or shipping the end-items shall display the locations of the documentation data package as necessary. The documentation data package attached to the JAXA-furnished articles and JAXA properties shall be maintained to the extent necessary.

2.2.9 Retention of quality records

The contractor shall identify quality records to be retained and define the retention periods of the quality records conferencing with JAXA, and shall retained the quality records for investigation determining the cause of nonconformance in operation phase after delivery. Quality records to be retained shall include electronically managed records and supplier's quality records as necessary.

Appendix-1 Glossary of Terms

Acceptance test

Test to verify that each article is acceptable as flight hardware.

Action

Actions performed on a non-conforming article to restore it to a usable condition by removing unsatisfactory conditions, or the act of re-fabricating the article. The details of dispositions are determined in a Preliminary Review or by a Material Review Board. The action "use-as-is", where the article is used despite a nonconforming condition even though it is still usable. Disposition can include: the article is returned to supplier; or the article is scrapped, where the article will be delivered again or re-fabricated.

Approval (by JAXA)

Formal approval by JAXA on approval inquiry documents.

Approval (by JAXA representative)

To obtain JAXA representatives' approval on documents including technical memorandum.

Article

Hardware or a part of hardware required in the contract. The articles include software integrated into the hardware. There are three forms for articles; the product, the item and the goods.

E.g.

The product: final products [usually deliverables])

The item: final item, quality inspection subject item

The goods: supplies, defective product etc.

As-Build Configuration

Article configuration of system, hardware related to component items, or software after fabrication/test completion.

As-Designed Configuration

Article configuration of system or hardware related to component items after the end of the decision stage, or configuration of software at the end of each design stage (e.g. design review board).

Contractor

An individual or organization who enters into a prime contract with JAXA. Contractor is described as "organization" in JIS Q 9100.

End Item

The articles delivered to JAXA according to the contract.

Fabrication

The act of manufacturing, inspection and/or testing of the launch vehicles and satellites of which design has been determined to deliver to JAXA.

Important processing parameter

A controllable factor (parameter) in processing that seriously affects the important quality characteristics of an item. For example, brazing blazing temperature and heating time, arc welding current value and speed.

Important quality characteristics

Characteristics of items, components, or materials (half-finished or finished goods) of which variations critically affect the performance, service life, mission accomplishment, etc. For example, the amount of lubricant inserted into a bearing unit, the activation timing or the leakage amount of valves in the assembly of an engine.

Manufacturing

The act of producing the article as instructed in drawings; the processes include parts processing, fabrication and completion of the assembly. Machining, processing, bonding, welding, soldering, thermal treatment, finishing, or assembly, are included in the manufacturing.

Nonconformance

A condition of any article or material or service in which one or more characteristics do not comply with specified requirements. These include failures, discrepancies, defects, insufficiencies and malfunctions.

Proto-Flight Test

A test for qualifying the design and manufacturing method of the article and accepting the article for actual flight or operational use. Both the "qualifying test" and the "acceptance test" are conducted with one article. (For details, refer to JERG-2-130 spacecraft general test standard.)

Qualification

Determination of an article being capable of meeting all prescribed requirements. Objects include design, manufacturing, inspection, testing, and their associated technical documents.

Quality Assurance

A planned system of all actions necessary to ensure that the end items will satisfy all quality requirements specified.

Quality Assurance Program Documents

Generic name of the documents necessary to implement the quality assurance of the products, but the quality record will be excluded.

Surveillance and Source Inspection

JAXA's continuous surveillance and source inspection to ensure the quality of the articles and the implementation status of the contractor's quality management (for example, Mandatory Inspection Point (MIP)).

Repair

Work performed on a nonconforming article or material to place it in a useable and acceptable condition. Repair work usually requires additional written procedures and additional work.

Rework

Work or continuation of work to complete the articles or comply with drawings, specifications, written procedures, or contractual requirements where the articles are incomplete or in a slight nonconforming state.

Serious Quality Problem

- ① When deliveries are delayed or the (probable or definite) cause of an operation (launching or tracking control) accident or nonconformance is attributable to a serious error or oversight in the design, fabrication, or operation process
- ② When serious nonconformance in the quality system is found in the reliability/quality assurance audit or the system element evaluation
- ③ When nonconformance caused by a deliberate act such as the falsification of data is found just before or after delivery

Subcontracted Articles subject to Source Inspection

Subcontracted articles or materials that are subject to source inspection

Suppliers

Person, company or business office dealing directly with the contractor and supplying articles and materials to the contractor. Suppliers include subdivisions of the same company and collaborative companies.

Tailoring

The act of changing the requirements to comply with applicable objects by selecting or rewriting the existing requirements, considering the conditions of the object the requirements are to be applied to.

Temporary Installations

Articles installed temporarily while producing the articles for fabrication, inspection, or testing reasons. Temporary installations include Non-Flight Item (NFI).

Variation Tree Analysis

A technique devised to analyze the human factors for nonconformance. The analysis technique, based on the Fault Tree Analysis (FTA), incorporates the concept of the flow of time enabling us to easily understand the nonconformance occurrence processes. It is very effective, particularly in interface adjustment or

communication where a relatively large amount of information flows, because of its peculiar description method. The study of variable factors (exclusion nodes) that must be eliminated to prevent nonconformance and points (breaks) that cut off a chain of variable factors, etc. from the schematic tree will provide clues for taking measures against nonconformance.

Why-Why analysis

This technique searches for nonconformance factors without omission in a methodical and orderly manner. This technique is characterized by not requiring special training. First, identify possible causes for the occurrence of the relevant nonconformance by speculating about the reason why. Second, track down each of the causes by speculating about the reason why repeatedly, looking for about five different alternatives, until the root cause is identified.

Appendix-2 Quality assurance program documents specifically required by JAXA
other than the documents required by JIS Q 9100

DOCUMENTS	APPLICABLE PARAGRAPH
Quality Assurance Program Plan	2.2.1
Cleanliness Control Requirements	2.2.5.4
Electrostatic Discharge Control Rule	2.2.5.5
Nonconformance Processing System Rules	2.2.6.11

Note: When the documents, which satisfy requirements of above paragraphs, are already established and implemented under the contractor's quality management system based on JIS Q 9100, the documents may be applicable (except for the quality assurance program plan).

Appendix-3 Quality records specifically required by JAXA other than the records required by JIS Q 9100

DOCUMENTS	APPLICABLE PARAGRAPH
Operation Life Control Records	2.2.5.3
Temporary Installation Records	2.2.5.6
Notification of the Qualification Change	2.2.3.4.2
Records of Cumulative Operating Time or Cycle Data	2.2.3.4.4
Nonconformance Document	2.2.6.2
Report Concerning the Prevention of the Recurrence of Serious Quality Problems	2.2.6.9
Article Records	2.2.8.1
Documentation Data Package	2.2.8.2

Note: Quality records other than above documents shall be prepared according to the contractor's quality management system based on JIS Q 9100, except for contractual requirements.

Appendix-4 Documents to be submitted

Document title	Applicable Paragraph	Submission Schedule	JAXA Action
Quality manual	2.2.1.3	A month after contract	Notification
Quality assurance program plan	2.2.1	A month after contract	Approval
Report concerning the prevention of the recurrence of serious quality problems	2.2.6.9	Immediately after a serious quality problem is identified	Notification
Nonconformance document (MRB)	2.2.6.2	At MRB review	Review
Documentation Data package	2.2.8.2	Delivery time	Review

Note: Above list is general standard and nomenclature of documents, submission schedule and JAXA action shall be in accordance with each contractual requirement.

Appendix-5 Dispositions of the nonconforming articles

Each disposition of the nonconforming articles is as follows:

(1) Rework

[PR and MRB]

If all the work on the articles has not been completed or if the nonconformance is too insignificant to impact functions, performance and reliability of the end items, and if the articles can be completed to meet the requirements specified in the drawings and specifications with work performed according to the existing technical documents or work instructions, the articles shall be reworked. The rework shall be recorded, and the reworked articles shall be subject to the standard inspections and testes during or after work.

(2) Repair

[PR]

If the causes of nonconformance are clear, and if the nonconformance is clearly so insignificant that repair will not affect functions, performance and reliability of the end items, or if standard repair procedures approved by the MRB apply, the articles shall be repaired. However, nonconformance occurring in the parts which interface with other articles and which causes recurring nonconformance shall be submitted to the MRB. When the standard repair procedures require changes, the procedures need to be re-approved by the MRB. The repair shall be conducted following the procedures and shall be recorded.

[MRB]

When the MRB acknowledges that the nonconforming articles may be satisfactorily repaired, they shall be repaired. The MRB shall establish or approve the required repair procedures. These procedures shall include the appropriate inspections and tests to confirm the acceptance or rejection of the test results. Repair work shall be performed according to the procedures and shall be recorded. When the contractor repairs the procured articles on its own, it shall do so after conferencing with the supplier and obtaining the advice and approval of the supplier. When the supplier repairs the nonconforming articles that are determined to be returned to the supplier because of their nonconforming action, the contractor and the supplier's MRB shall review the articles, depending on the nature of the repair.

(3) Scrap

[PR and MRB]

If the nonconforming article or material is obviously unfit for use at PRs, or if the MRB judges the nonconforming article or material unfit for use, it shall be scrapped. The articles shall be identified for scrap by using stamps, labels, tags, etc., according to the contractor's procedures for identifying, controlling, and disposing of these items.

(4) Use-as-is

[PR]

If the causes of nonconformance are clear, and if nonconformance is clearly so insignificant that the use of the nonconforming articles as they are will not affect functions, performance, or reliability of the end items, or if the nonconforming articles will pass the classification criteria approved by the MRB, the articles shall be used as they are. Nonconformance occurring in parts interfacing with other articles and with recurring nonconformance shall be submitted to the MRB. The rationale for "use-as-is" shall be stated in the nonconformance documents.

[MRB]

If the nonconformance will not affect the fundamental objectives of the contract such as safety, reliability, durability, functions, performance, interchangeability, and weight, and if the MRB judges that using the nonconforming articles without repair is appropriate, the articles shall be used as they are. The rationale for their "use-as-is" shall be stated in the nonconformance documents.

(5) Return to suppliers

[PR and MRB]

When a procured article or material is found to be nonconforming in the processes after the acceptance test, it shall generally be returned to the supplier. The contractor shall provide the supplier with nonconformance descriptions and with recommendations as necessary, when returning the nonconforming article or material.

Note: When performing irreversible tests or disassembly in the confirmation of the phenomenon or investigation of the cause of a problem, it is necessary to coordinate with JICA inspectors in advance and obtain

approval. However, minor nonconformities that do not clearly affect the function, performance, reliability, etc. of the final product are excluded.

Appendix-6 Root Cause Analysis of a nonconformance

When the contractor controls nonconforming product in accordance with paragraph 8.7, "Control of Nonconforming Output", and paragraph 10.2, "Nonconformance and Corrective Action", of JIS Q 9100, JAXA recommends following root cause analysis of a nonconformance.

The contractor shall use the "HANDBOOK FOR METHOD OF HUMAN FACTORS ANALYSIS" (JERG-0-018) for root cause analysis. If an approach equivalent to those described in this handbook or superior approach is available, it may be used. The results of the root cause analysis analyses should be reported to JAXA through MRB as necessary.

(1) Variation tree analysis

If two or more departments or agencies are involved in the process of addressing nonconformance, a variation tree analysis is preferable. A variation tree analysis should be combined with a "Why-Why Analysis" described below as necessary.

A technique devised to analyze the human factors for nonconformance. The analysis technique, based on the Fault Tree Analysis (FTA), incorporates the concept of the flow of time enabling us to easily understand the nonconformance occurrence processes. It is very effective, when there are many information exchanges such as interface adjustment and communication, because of its peculiar description method. The study of variable factors (exclusion nodes) that must be eliminated to prevent nonconformance and points (breaks) that cut off a chain of variable factors, etc. from the schematic tree will provide clues for taking measures against nonconformance.

(2) Why-Why Analysis

A Breakdown Cause Analysis or "Why-Why" Analysis is methodically preferable without omission to search for nonconformance factors including the motivating background.

This technique is characterized by not requiring special training. First, this technique requires to identify possible causes for the occurrence of the relevant nonconformance by speculating about the reason why. Second, it is needed to track down each of the causes by speculating about the reason why repeatedly, looking for about five different alternatives, until the root cause is identified.

Appendix-7 The rationale of JAXA-specific requirements

(Note: Paragraph number of JIS Q 9100 is according to JIS Q 9100:2016)

JAXA-specific Requirements	Rationale
<p>2.2 JAXA-specific requirements</p> <p>The contractor shall satisfy JAXA-specific requirements specified in paragraphs 2.2.1 to 2.2.7 of this standard. The contractor shall adopt JIS Q 9100-based quality management system effectively and efficiently to implement the JAXA-specific requirements. When tailoring of JAXA-specific requirements is conducted according to paragraph 1.2.3 of this standard, the tailoring shall take precedence.</p>	<p>It is specified that the contractor shall satisfy JAXA-specific requirements.</p>
2.2.1 Quality Assurance Program	(Title)

JAXA-specific Requirements	Rationale
<p>2.2.1.1. Establishment, maintenance and approval of quality assurance program plan</p> <p>The contractor shall establish quality assurance program plan, which describes the implementation of the quality assurance program according to the requirements of this standard, as required for each contract and obtain approval from the adequate organization in charge in JAXA. When the contractor generates standard quality assurance program documented as the Standard Quality Assurance Program Plan according to the requirements of this standard, and set an individual quality assurance program plan for each contract, the Standard Quality Assurance Program Plan shall be submitted to and approved by JAXA Safety and Mission Assurance Department. The contractor shall re-submit the quality assurance program plan to JAXA where any change is made in the content of the quality assurance program plan, and is required to obtain re-approval whenever JAXA judges it to be important.</p>	<p>This standard presupposes that the contractor establishes quality assurance program plan, submit to the department of JAXA in charge and obtain the approval, and implement quality assurance activities in accordance with the quality assurance program plan. It is specified as JAXA-specific requirement that the contractor shall establish and maintain the quality assurance program plan.</p>

JAXA-specific Requirements	Rationale
<p>2.2.1.2 Contents of quality assurance program plan</p> <p>The contractor shall describe at least the following items in the quality assurance program plan and the format of the plan shall be easily identified with each JAXA-specific requirement in this standard.</p> <p>The contractor shall refer to Appendix-2, "Quality assurance program documents specifically required by JAXA other than the documents required by JIS Q 9100" and Appendix-3, "Quality records specifically required by JAXA other than the records required by JIS Q 9100" concerning quality assurance program documents and quality records.</p> <p>(1) Title, document number, certification number, handling notice of quality manual to implement basic requirements in paragraph 2.1 of this standard.</p> <p>(2) A description concerning all organizations involved with JAXA-specific requirements and their functions and responsibilities.</p> <p>(3) Descriptions of when, by which organization, and by which methods each task relating to JAXA-specific requirements will be executed and how each task is managed.</p> <p>(4) Lists showing the relationship of each task with quality assurance program documents, including internal documents or regulations that are applied for JAXA-specific requirements.</p> <p>tasks.</p>	<p>Contents of quality assurance program plan are specified as JAXA-specific requirements to confirm that the requirements are properly described in the quality assurance program plan.</p> <p>Item (1) specifies title, document number, certification number, handling notice of quality manual to implement basic requirements (disclosure limitation conditions), and etc. involving paragraph 2.1 of this standard. Items (2) – (7) specify to confirm that the quality assurance program plan satisfies JAXA-specific requirements.</p> <p>As references, appendix-2 and appendix-3 show quality assurance program documents and quality records specifically required by JAXA other than the documents and records required by JIS Q 9100.</p>

JAXA-specific Requirements	Rationale
<p>2.2.1.2 Contents of quality assurance program plan (Cont'd)</p> <p>(5) Identification in the quality assurance program documents list specified in (4) of the documents that utilize existing quality assurance program documents, require changes, or require that new documents be prepared.</p> <p>(6) Lists of quality records.</p> <p>(7) Identification of tasks that duplicate or complement other program requirements in the contract, as well as details of these</p>	

JAXA-specific Requirements	Rationale
<p>2.2.1.3 Submitting quality assurance program documents</p> <p>The contractor shall submit the quality assurance program documents, in accordance with the following criteria specified in the contract, for the approval, review and notification categories. Appendix-4 shows the documents to be submitted.</p> <p>(1) Approval: Documents need JAXA approval prior to application, based on the contract.</p> <p>(2) Review: Documents need JAXA evaluation prior to application, based on the contract.</p> <p>(3) Notification: Documents received by JAXA based on the contract.</p> <p>The contractor shall submit quality manual based on JIS Q 9100 to JAXA Safety and Mission Assurance Department (The contractor shall notify JAXA Safety and Mission Assurance Department of the quality manual).</p> <p>The contractor shall notify JAXA Safety and Mission Assurance Department of any change in the quality manual.</p> <p>When the contractor is unable to submit quality manual to JAXA for the contractor's reasons, the contractor shall coordinate with JAXA and follow JAXA's instructions. Even if the contractor is unable to submit quality manual to JAXA, the contractor shall present the quality manual to JAXA.</p>	<p>Criteria for submitting quality assurance program documents shall be specified as contractual requirements. The criteria are specified in this standard as in other JAXA standards. Appendix-4 shows documents to be submitted.</p> <p>JIS Q 9100 is considered as basic requirements for this standard. It is specified as JAXA-specific requirement that the contractor shall submit quality manual to JAXA (notify JAXA of quality manual) to confirm that the contractor implements quality assurance program in accordance with JIS Q 9100.</p> <p>Also, the handling in case that contractor changes quality manual and can't submit it to JAXA was specified as a JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.2 Identification control and traceability</p> <p>The contractor shall control identification and ensure traceability.</p>	<p>Where traceability is a requirement, the contractor shall control the unique identification of the product and maintain records according to paragraph 8.5.2, "Identification and Traceability" of JIS Q 9100.</p> <p>The traceability management is specified as a requirement since the traceability management is important for quality assurance and defect investigation, etc. in the rocket, satellite and aeronautical fields.</p>
2.2.3 Design and development	(Title)
2.2.3.1 Responsibilities of quality assurance department at reviews	(Title)

JAXA-specific Requirements	Rationale
<p>2.2.3.1.1 Design review</p> <p>The quality assurance department of the contractor shall evaluate the following to ensure that the design and development are verified and/or validated at the design reviews to be conducted in accordance with JMR-004, "Reliability Program Standard".</p> <p>(1) Requirements regarding the characteristics required for the various processes to include procurement, fabrication, inspection, and testing. The requirements and the standards, criteria, and specifications applied to these processes are specified, and their contents are deemed appropriate.</p> <p>(2) Inspection and test plans are appropriate with respect to quality assurance, and acceptance criteria are clear.</p> <p>(3) Workability and testability of the product, and reproducibility of manufacturing are considered.</p> <p>(4) Identification control requirements are appropriate.</p> <p>(5) Quality assurance requirements in the interface control documents are appropriate.</p> <p>(6) Applicable actions of previous nonconformance are reflected.</p> <p>(7) Documents required for a quality assurance program are prepared and maintained.</p>	<p>This paragraph is to provide an additional explanation for paragraph 8.3.4, "Design Development Validation" of JIS Q 9100. The design reviews are also important as quality assurance activities for development and fabrication of a launch vehicle and spacecraft, considering the relationship between design reviews and project management. It is specified that the design reviews shall be conducted in accordance with JMR-004, "Reliability Program Standard", and responsibilities of the quality assurance department of the contractor at design reviews are specified.</p> <p>This standard does not require the quality assurance department of the contractor to conduct all items (1) – (7), but requires the quality assurance department of the contractor to evaluate that the items (1) – (7) are confirmed definitely as an organization.</p>

JAXA-specific Requirements	Rationale
<p data-bbox="225 309 783 342">2.2.3.1.2 Post-qualification-test review</p> <p data-bbox="225 383 823 797">The quality assurance department of the contractor shall evaluate the following to ensure that the design and development are verified and/or validated and that the fabrication processes are verified at the post-qualification-test reviews (including post-qual-flight-test reviews) to be conducted in accordance with the reliability program requirements.</p> <ul style="list-style-type: none"> <li data-bbox="225 813 767 943">(1) Qualification test results are accurately recorded, and technical assessments are conducted. <li data-bbox="225 958 804 1037">(2) All requirements for qualification are satisfied. <li data-bbox="225 1052 823 1182">(3) Changes in design and fabrication processes initiated after critical design are validated. <li data-bbox="225 1198 815 1373">(4) Any nonconformance is processed according to paragraph 2.2.6 of this standard, and re-testing is confirmed to be unnecessary. 	<p data-bbox="845 309 1385 1059">This paragraph is to provide an additional explanation for paragraph 8.3.4, "Design Development Validation" of JIS Q 9100. As in design review, considering the relationship between post-qualification-test reviews and project management, it is specified that the post-qualification-test reviews shall be conducted in accordance with JMR-004, "Reliability Program Standard", and responsibilities of the quality assurance department of the contractor at design reviews are specified.</p> <p data-bbox="845 1075 1394 1442">This standard does not require the quality assurance department of the contractor to conduct all items (1) – (4), but requires the quality assurance department of the contractor to evaluate that the items (1) – (4) are confirmed definitely as an organization.</p>

JAXA-specific Requirements	Rationale
<p data-bbox="225 309 660 342">2.2.3.1.3 Pre-shipment review</p> <p data-bbox="225 383 823 607">The quality assurance department of the contractor shall evaluate the following to ensure that end items are able to be delivered to JAXA at pre-shipment reviews.</p> <ul style="list-style-type: none"> <li data-bbox="225 622 823 752">(1) Acceptance test (AT) results are accurately recorded, and technical assessments are conducted. <li data-bbox="225 763 823 846">(2) All quality records are maintained and managed. <li data-bbox="225 857 823 940">(3) All quality related requirements in the contract are satisfied. <li data-bbox="225 952 823 1034">(4) All nonconformance actions are completed. <li data-bbox="225 1046 823 1128">(5) Documentation Data package are completed. <li data-bbox="225 1140 823 1368">(6) All changes in design and fabrication processes initiated after completion of qualification tests are validated, and such changes are incorporated in the related documents. 	<p data-bbox="847 309 1394 584">The contractor shall plan and carry out production and service provision under controlled conditions including the implementation of product release, delivery and post-delivery activities according to the paragraph 8.5.1 “Control of Production and Service Provision”, item h of JIS Q 9100. Records shall indicate the person(s) authorizing release of product for delivery to the customer according to paragraph 8.2.4, “Monitoring and Measurement of Product” of JIS Q 9100. This paragraph 2.2.6.3 is to provide an additional explanation for paragraph 7.5.1, item f) and paragraph 8.2.4 of JIS Q 9100. Considering the relationship between pre-shipment review and project management, responsibilities of the quality assurance department of the contractor at pre-shipment reviews are specified.</p> <p data-bbox="847 1413 1394 1778">This standard does not require the quality assurance department of the contractor to conduct all items (1) – (6), but requires the quality assurance department of the contractor to evaluate that the items (1) – (6) are confirmed definitely as an organization.</p>

JAXA-specific Requirements	Rationale
<p>2.2.3.2 Use of previously developed articles</p> <p>The contractor shall verify the quality assurance program applied to the fabrication of the previously developed articles and prove that the use of the previously developed articles does not have a problem when the contractor proposing the use of articles procured or fabricated for which the qualification test and development have been completed; i.e. the contractor shall prove the article are developed and manufactured under the quality assurance program equivalent level of the requirements in this standard.</p>	<p>Use of previously developed articles is explained in paragraph 8.3.4, "Design and Development controls" of JIS Q 9100. According to JIS Q 9100 paragraph 8.6 "Release of products and services", the contractor shall provide evidence that the product complies with requirements. However, JIS Q 9100 paragraph 8.6 does not stipulate specific requirements, this requirement was defined as a JAXA-specific requirement assuming the use of already developed products. Supposing the diversion of previously developed articles, the use of previously developed articles is specified as JAXA-specific requirement.</p> <p>When the product includes previously developed articles, and when the quality assurance level of the previously developed articles is not ensured to be equivalent to the requirements of this standard, quality assurance level of complete product is not ensured. Therefore, JAXA needs to confirm quality assurance level of the previously developed articles as a matter of course.</p>
2.2.3.3 Change control	(Title)

JAXA-specific Requirements	Rationale
<p>2.2.3.3.1 Change control system</p> <p>The contractor shall establish and maintain a system that controls changes in design, fabrication processes, inspection methods, and test methods.</p> <p>(1) Change control shall be coordinated with the control system based on JMR-006, "Configuration Management Standard", including reporting to, and obtaining approval from, JAXA, and shall be effectively executed.</p> <p>(2) Changes that involve interface relationships or affect articles not under the design control of the contractor shall be coordinated with the affected parties. The contractor shall obtain the agreement of the affected parties with the proper documentation.</p>	<p>The contractor shall establish, implement and maintain a configuration management process, which includes change control, according to paragraph 8.1.2, "Configuration Management" of JIS Q 9100. Change control of fabrication or service delivery is required in paragraph 8.5.6, "Control of change" of JIS Q 9100.</p> <p>Considering the relationship between this standard and JMR-006, "Configuration Management Standard", especially approval by JAXA, change control is specified as JAXA-specific requirement for clarification.</p> <p>Since the coordination and agreement concerning changes in interface requirements are important from the point of view of nonconformance prevention, the coordination and agreement are also specified as JAXA-specific requirements.</p>
2.2.3.4 Qualification tests	(Title)

JAXA-specific Requirements	Rationale
<p data-bbox="225 309 751 387">2.2.3.4.1 Control of qualification test articles</p> <p data-bbox="225 427 815 651">When the contract requires qualification tests (include proto-flight test), the contractor shall control articles subject to qualification testing according to the following:</p> <p data-bbox="225 667 823 1126">(1) Qualification test articles shall pass the tests to ensure that they can withstand in an environment more severe than actual flight or operational use (hereinafter referred to as "actual flight or operational use") In the proto flight test, the contractor shall pay enough consideration so as not to give an excessive load which affects the function, performance, life, etc.</p> <p data-bbox="225 1144 823 1317">(2) Qualification test articles shall be identified so they may be distinguished from identical articles for actual flight or operational use.</p> <p data-bbox="225 1335 823 1608">(3) Qualification test articles shall be representative of the articles for actual flight or operational use that are generally fabricated according to the same processes and using the same configuration.</p> <p data-bbox="225 1626 751 1704">(4) Qualification test articles shall be selected as randomly as possible.</p> <p data-bbox="225 1722 815 1989">(5) The results of the qualification tested articles shall be recorded after testing. Such articles shall not be used for actual flight or operational use, except obtaining special approval of JAXA by technical evaluation or refurbishment.</p> <p data-bbox="767 2074 823 2107">- 41</p>	<p data-bbox="845 309 1396 1104">The contractor shall define test objectives and conditions, parameters to be recorded and relevant acceptance criteria in test plans or specifications, and shall submit the correct configuration of the product for the test according to paragraph 8.3.4.1, "Design and Development Verification and Verification Testing" of JIS Q 9100. Where required to demonstrate product qualification, the contractor shall ensure that records provide evidence that the product meets the defined requirements according to paragraph 8.6, "Monitoring and Measurements of Product" of JIS Q 9100.</p> <p data-bbox="845 1122 1396 1872">Since qualification test (including proto-flight test) for a launch vehicle and spacecraft corresponds to the demonstration of product qualification, control of qualification test articles is specified as JAXA-specific requirement. Although qualification test requirements are specified in JMR-004, "Reliability Program Standard", the requirement for control of qualification test articles is not specified in JMR-004. From the point of view of quality assurance, the control of qualification test articles is specified as JAXA-specific requirement in this standard.</p> <p data-bbox="845 1890 1396 2159">Since the proto-flight test article (proto-flight model) needs to be carefully designed to ensure both adequacy as a certification and quality as a flight product, the requirements for that is specified here.</p>

JAXA-specific Requirements	Rationale
<p data-bbox="225 309 667 342">2.2.3.4.2 Re-qualification tests</p> <p data-bbox="225 383 823 607">The contractor shall conduct re-qualification tests when the contractor determines that it falls under any of the following items and re-qualification is necessary;</p> <ul data-bbox="225 622 823 1081" style="list-style-type: none"> • At changes of the design, fabrication process, inspection method, test method of the qualified articles, or the procurement source. • Articles have repeated non-conformance • The result of anomaly, inspection, test, and actual flight or operational use indicates the need for re-qualification. <p data-bbox="225 1099 823 1178">When one of the above conditions occurs, the contractor shall conduct the following:</p> <ol data-bbox="225 1196 823 1505" style="list-style-type: none"> (1) Provide JAXA with written notification of the changes requested. (2) Specify the need for and extent of the re-qualification test. (3) Obtain approval of the JAXA representative when conducting re-qualification tests. 	<p data-bbox="845 309 1394 678">The contractor shall demonstrate that the product definition meets the specification requirements at the completion of design/and or development according to paragraph 8.3.4.1, "Design and Development Verification and Validation Documentation" of JIS Q 9100. Similar to the requirements for qualification tests, requirements for re-qualification tests are not specified in JIS Q 9100. This is the reason why re-qualification tests are specified as JAXA-specific requirements.</p> <p data-bbox="845 696 1394 1301">Although re-qualification test requirements are considered to be specified in JMR-004, Reliability Program Standard", the requirements are not specified in JMR-004. This is the reason why re-qualification tests are specified in this standard.</p>

JAXA-specific Requirements	Rationale
<p data-bbox="225 309 823 342">2.2.3.4.3 Qualification based on similarity</p> <p data-bbox="225 383 823 987">The contractor may request JAXA approval for similar articles outside the scope of the corresponding contract that have been subjected to qualification testing based on their similar uses and utility. In such cases, the contractor shall ensure that the similarity between the articles is established and that the articles have undergone environmental testing resulting in similar, levels, times, and operating conditions at least as stringently as qualification levels required for the articles under the applicable contract.</p>	<p data-bbox="845 309 1394 439">Qualification based on similarity is one of the methods for validation of design and development in JIS Q 9100.</p> <p data-bbox="845 454 1394 819">Where required to demonstrate product qualification, the contractor shall ensure that records provide evidence that the product meets the defined requirements according to paragraph 8.6, "Monitoring and Measurement of Product" of JIS Q 9100.</p> <p data-bbox="845 835 1394 1393">Since JAXA considers similarity as to be equivalent to qualification test in qualification, qualification based on similarity is specified as JAXA-specific requirement. Although requirements for qualification based on similarity are considered to be specified in JMR-004, "Reliability Program Standard", the requirements are not specified in JMR-004. This is the reason why qualification based on similarity is specified in this standard.</p>

JAXA-specific Requirements	Rationale
<p>2.2.3.4.4 Reports for qualification tests</p> <p>The contractor shall prepare reports for every test (including qualification test, proto-flight test, and acceptance test [AT]) according to the contractual requirements (including following items (1) ~ (7)).</p> <p>(1) Nomenclature and identification number of articles</p> <p>(2) Nomenclature and identification number of the articles removed or replaced during testing</p> <p>(3) Copies of approved deviations or waivers</p> <p>(4) Summary of test data and results</p> <p>(5) Historical log of nonconformance</p> <p>(6) List of critical items and articles with operating life</p> <p>(7) Cumulative operating time or cycle data for articles</p>	<p>The contractor shall ensure that reports, calculations, test results, etc., demonstrate that the product definition meets the specification requirements for all identified operational conditions according to paragraph 8.3.4.1, "Design and Development Verification and Validation Documentation" of JIS Q 9100.</p> <p>Since JAXA needs clarification of items to be included in reports for every test (including qualification test and acceptance test), reports for qualification tests are specified as JAXA-specific requirement.</p> <p>Although requirements for reports for qualification tests are considered to be included in paragraph 2.2.5.9, "Documentation Data Package" of this standard, the reports may be required not at delivery but at the completion of the tests and the reports may be required not as documentation data package but as test results reports. This is the reason why the contractor shall prepare reports for every test according to the contractual requirements.</p>

JAXA-specific Requirements	Rationale
<p>2.2.3.4.5 Confirmation before and after tests</p> <p>Prior to and subsequent to qualification testing, proto-flight testing, acceptance testing (AT) and/or post-launch-site-delivery-testing, the contractor shall define items to be confirmed at task briefing, which is held to confirm that preparation activities for the testing are completed, and at task review, which is held to confirm the test results after completion of the testing. The contractor shall confirm the items.</p>	<p>This paragraph 2.2.3.4. is to provide an additional explanation for paragraph 8.3.4.1, "Design and Development Verification and Validation Testing" of JIS Q 9100. Since task briefing (TB) and task review (TR) are considered to be mandatory for tests, confirmation before and after tests is specified as JAXA-specific requirement.</p>
2.2.4 Procurement controls	(Title)
<p>2.2.4.1 Purchasing of imported parts and components</p> <p>The contractor shall conduct purchasing activities at each stage, including the selection, setting of technical specifications and procurements requirements, the review meeting, the witnessing of manufacturing, and the receiving inspection, with respect to imported parts and components, while referring to JERG-0-050, "Quality Improvement Guideline for Imported Parts in Satellite Development" and JERG-0-051, "Quality Improvement Guideline for Imported Components in Satellite Development".</p>	<p>Purchasing of imported parts and components is specified as JAXA-specific requirement to apply JERG 0-050, "Quality Improvement Guideline for Imported Parts in Satellite Development" and JERG-0-051, "Quality Improvement Guideline for Imported Components in Satellite Development".</p> <p>Since a lot of nonconformance has occurred in imported parts and components, purchasing of imported parts and components is specified as JAXA-specific requirement.</p>
2.2.5 Fabrication controls	(Title)

JAXA-specific Requirements	Rationale
<p>2.2.5.1 Process quality evaluation</p> <p>The contractor shall compare the important quality characteristics and important processing parameters of the critical items required by JMR-004, "Reliability Program Standard", with previous similar items (including engineering models) prior to proceeding to the subsequent processes. If there is a discrepancy or change in the data that is deemed to be an anomaly, the departments of the contractor, including the engineering department, shall decide the disposition.</p>	<p>General production control is required in paragraph 8.5, "Production and Service Provision" - paragraph 8.5.1, "Control of Production and Service Provision" of JIS Q 9100.</p> <p>Since requirements for management of "important quality characteristics" and "important processing parameters" as process control methods to prevent nonconformance are specified in JMR-004, "Reliability Program Standard", those management is identified as JAXA-specific requirement in JMR-013. JIS Q 9100 requires identification, control and monitoring of critical items including key characteristics. Since the essentials of "important quality characteristics" and "key characteristics" are same, "important quality characteristics" and "important processing parameters" can be controlled as a part of "key characteristics"</p>
<p>2.2.5.2 Special Process Controls</p> <p>The contractor shall control the special process. This standard does not specify the special process, but it generally includes heat treating, welding, bonding, soldering, surface finishing, non-destructive inspection, chemical processing and so on.</p>	<p>While JIS Q 9100 8.5.1.2 requires validation and control of special processes which includes qualification or approval of facilities, equipment, process, and person, JIS Q 9100 does not define any specific name of special process.</p> <p>JAXA intends to provide certain name of processes as a general example. Especially, JAXA intends to show that the soldering process is identified as an important special process.</p>

JAXA-specific Requirements	Rationale
<p>2.2.5.3 Operation life limitation article and material controls</p> <p>The contractor shall display, record, and maintain the time or cycles required to control the operational life for all articles and materials with definite quality degradation characteristics or characteristic changes with age or use.</p>	<p>Requirement, which is similar to paragraph 2.2.5.3 of this standard, is specified for shelf life control and stock rotation in paragraph 8.5.4, item e) of JIS Q 9100. It is considered that shelf life control of JIS Q 9100 is applicable only to storage life. Since the requirement in this standard is applicable to operation life including operating time and cycles, the operation life limitation article and material controls are specified as JAXA-specific requirements.</p>

JAXA-specific Requirements	Rationale
<p>2.2.5.4 Cleanliness control</p> <p>The contractor shall control the fabrication, inspection and test areas in accordance with documented cleanliness requirements for environments, handling, workbenches, tools, and storage containers, and devices or equipment to prevent the contamination of materials.</p>	<p>The contractor shall determine and manage the work environment needed to achieve conformity to product requirements according to paragraph 7.1.3, "Infrastructure" of JIS Q 9100. The contractor shall preserve the product and the preservation of product shall include cleaning, prevention, detection and removal of foreign objects according to paragraph 8.5.4 "Preservation" of JIS Q 9100. Cleanliness is one of work environment. Where cleanliness is specified in product requirements, cleanliness control is required. Since JAXA requires a wider range of cleanliness control and establishment of documented cleanliness requirements for environments, handling, workbenches, tools, and storage containers, and devices or equipment used to prevent the contamination of materials, cleanliness control is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.5.5 Electrostatic discharge controls</p> <p>The contractor shall establish and comply with the standards for electrostatic discharge controls for electric parts susceptible to electrostatic discharge and assemblies or devices containing such parts.</p>	<p>Although work environment control is required in paragraph 7.1.3, "Infrastructure" of JIS Q 9100, the term "electrostatic" is not shown (the term was shown in JIS Q 9100:2004). When electrical parts are damaged by electrostatic discharge, there are risks of cost increase, schedule delay, and workmanship-error concerning refurbish. Since a lot of nonconformance by electrostatic discharge has occurred, electrostatic discharge controls are specified as JAXA-specific requirement.</p>
<p>2.2.5.6 Control of temporary installed items</p> <p>The contractor shall control the articles temporarily installed in hardware under fabrication (hereinafter referred to as "temporary installation") based on the following items:</p> <p>(1) Temporary installations shall be clearly identified.</p> <p>(2) Installation and removal of temporary installations shall be recorded in the fabrication records.</p>	<p>Control of temporary installed items is required in paragraph 8.5.1, "Control of Production and Service Provision", item o), "provision for the prevention, detection and removal of foreign objects" of JIS Q 9100. In some cases, the control of temporary installed items is considered to be control of remaining foreign objects in JIS Q 9100. Since it is not possible to access to the temporary installed items onboard spacecraft on-orbit differently on the ground, special attention shall be given to the temporary installed items. Since the requirement for the control of temporary installed items is a launch vehicle- and spacecraft-specific, the control of temporary installed items is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.5.7 Establishing and maintaining fabrication processes</p> <p>The contractor shall establish and maintain the fabrication processes according to the following procedures:</p> <p>(1) The completion of a Critical Design Review (CDR) and matters necessary to take proper measures for the CDR shall be the baseline of change management to establish and maintain the fabrication processes.</p> <p>(2) The contractor shall confirm in a Post-Qualification-Test Review (PQR) or an equivalent review that the fabrication process has been verified. The confirmation shall constitute the establishment of the authorized fabrication process.</p> <p>(3) Flight hardware shall be fabricated according to the fabrication instruction document for the established fabrication process. Even if a partial change after completion of qualification of fabrication process is made, re-qualification of fabrication process shall be conducted. If there is only a minor change applied, and it shows that the quality of the higher-level products subsequent processes is not clearly affected by the demonstration test or analysis, re-qualification of fabrication process may be exempted by providing sufficient technical basis.</p>	<p>Establishing and maintaining fabrication processes are required in paragraph 8.5.1.1 "Control of equipment, tools, and software programs", paragraph 8.5.1.3 "Production process verification", and paragraph 8.5.6 "Control of changes" of JIS Q 9100. Although JIS Q 9100 emphasizes that production process shall be verified by first article inspection, JAXA requires the contractor to establish fabrication processes at design reviews. It is specified as JAXA-specific requirement that the contractor shall conduct change control firmly after establishing baseline of fabrication processes and that the contractor shall conduct re-qualification where change is made.</p>

JAXA-specific Requirements	Rationale
<p>2.2.5.8 Performing the inspections and tests</p> <p>The contractor shall conduct inspections and testing according to test specifications, inspection procedures, and other technical documents. The inspections and testing shall be performed on procured and fabricated articles prior to their installation into the next higher level of assembly. The inspections and testing shall also include a review of the inspection and test records. The contractor shall keep records to ensure that each inspection or test is traceable to the individual responsible persons for its completion.</p>	<p>Evidence that all production and inspection/verification operations have been completed as planned, or as otherwise documented and authorized, is required in paragraph 8.5.1, "Control of Production and Service Provision", item n) of JIS Q 9100. The contractor shall plan and carry out production and service provision considering identification of in-process inspection/verification points when adequate verification of conformance cannot be performed at later stages of realization according to paragraph 8.5.1 of JIS Q 9100. The contractor shall monitor and measure the characteristics of the product at appropriate stages of the product realization process according to paragraph 8.6 "Release of products and services" of JIS Q 9100. Since JAXA definitely requires the contractor to conduct inspections and testing prior to installations of procured and fabricated articles into the next higher level of assembly and to ensure that each inspection or test is traceable to the individual responsible persons for its completion, performing the inspections and tests is specified as JAXA-specific requirement.</p>
2.2.6 Nonconformance control	(Title)

JAXA-specific Requirements	Rationale
<p data-bbox="225 309 448 338">2.2.6.1 General</p> <p data-bbox="225 383 823 1081">The contractor shall establish and maintain a documented nonconformance processing system to identify and isolate nonconforming articles, disposing of them properly. The system will ensure that corrective actions (hereinafter referred to as "actions") are taken when the articles do not comply with the requirements specified in the applicable drawings and specifications and when the article's performance is questionable (or in an error condition). This system shall be coordinated with the problem/failure requirements specified in JMR-004, "Reliability Program Standard".</p> <p data-bbox="225 1149 823 1653">Appendix-5, "Dispositions of the nonconforming articles" defines the actions of the nonconforming articles. Prior to determining the actions of nonconforming articles, the contractor shall determine the causes and mechanism for nonconformance as necessary, properly evaluate the level of potential effects, and investigate or analyze the articles to determine the most effective solution.</p> <p data-bbox="225 1675 823 1944">When nonconformance occurs that will seriously affect the development schedule, costs, or interface, the contractor shall perform the root cause analysis using Appendix-6, "Root Cause Analysis of nonconformance" as reference.</p>	<ul style="list-style-type: none"> <li data-bbox="845 309 1394 813">- Although JIS Q 9100 uses the term "nonconformity", not only the case that the product does not obviously conform to required specification, but also the functionally questionable phenomenon (including deviation, defect, insufficiency and malfunction) and anomaly/failure specified in JMR-004, "Reliability Program Standard" shall be considered as "nonconformance", this standard uses the term "nonconformance". <li data-bbox="845 835 1394 1440">- Although basic requirements for nonconformance control are specified in paragraph 8.7, "Control of Nonconforming Outputs" of JIS Q 9100, the nonconformance control is the most important activity. This is the reason why establishment of nonconformance processing system is specified as JAXA-specific requirement in this standard. Furthermore, it is specified that nonconformance processing system shall be coordinated with the anomaly/failure requirements specified in JMR-004, "Reliability Program Standard". <li data-bbox="845 1462 1394 1865">- This standard is intended to reflect nonconformance control requirements in the contractor's nonconformance processing system based on documented procedure in paragraph 8. 7, "Control of Nonconforming Outputs" of JIS Q 9100. This standard does not require the contractor to establish new system to be different from the system based on documented procedure in JIS Q 9100. <li data-bbox="845 1888 1394 2063">- Nonconformance cause analysis and root cause analysis of serious nonconformance are also specified as JAXA-specific requirements.

JAXA-specific Requirements	Rationale
<p>2.2.6.2 Documentation of nonconformance</p> <p>The contractor shall document all nonconformance. The documentation concerning nonconformance shall state the following items as a minimum:</p> <ul style="list-style-type: none"> (1) Nomenclature and identification number of the nonconforming articles (2) Date and process in which nonconformance is detected. (3) Nonconformance descriptions and acceptance and rejection criteria. (4) Cause of nonconformance. (5) Description of nonconformance actions (6) Distinctions between the Preliminary Reviews (PRs) and Material Review Board (MRB) (7) Descriptions of corrective actions (8) Names of persons who recorded the descriptions indicated above and signature of the designated board members and date 	<p>Although basic requirements for nonconformity control are specified in paragraph 8.7, "Control of Nonconforming Outputs " and paragraph 10.2, "Nonconformance and Corrective Action" of JIS Q 9100, this standard requires "nonconformance" control.</p> <p>Furthermore, the documentation of nonconformance is mandatory for confirmation on disposition of nonconformance by JAXA. This is the reason why documentation of nonconformance is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p data-bbox="225 309 711 342">2.2.6.3 Preliminary Reviews (PRs)</p> <p data-bbox="225 383 823 1417">The designated board member of the contractor's quality assurance department and the designated board member of the contractor's engineering department responsible for designing the nonconforming article shall review the nonconforming article, selecting one of the following actions after consulting with each other. They shall also confer with the fabrication, procurement, and other associated departments as necessary. When technical evaluation is unnecessary for minor rework, scrap and returning to suppliers at receiving inspections, reviews by the designated board member of the contractor's engineering department may be exempted. When the cause of the nonconformance is clearly supplier's fault, the nonconforming articles may be returned to suppliers by designated board member even if the nonconformance occurs after receiving inspections.</p> <ul style="list-style-type: none"> <li data-bbox="225 1435 384 1469">(1) Rework <li data-bbox="225 1480 368 1514">(2) Repair <li data-bbox="225 1525 360 1559">(3) Scrap <li data-bbox="225 1570 416 1603">(4) Use-As-Is <li data-bbox="225 1615 544 1648">(5) Return to suppliers <li data-bbox="225 1659 823 1897">(6) Submission to MRB: When nonconformance action is inappropriate to be determined at PRs, the nonconforming article or material shall be submitted to MRB for final action. 	<p data-bbox="845 309 1393 869">The Preliminary Reviews (PRs), at which the contractor selects disposition methods of nonconforming articles, are specified as JAXA-specific requirements. "Repair" and "use-as-is" are included in disposition methods as usual and it is specified that the designated board member of the contractor's engineering department responsible for designing the nonconforming article shall be included in the member of PRs.</p>

JAXA-specific Requirements	Rationale
<p>2.2.6.4 Review by JAXA representative</p> <p>Records of nonconformance action which was determined at preliminary reviews shall be reviewed by JAXA representatives when required.</p>	<p>For secure confirmation on PRs by JAXA, it is specified as JAXA-specific requirement that records of nonconformance disposition which was determined at preliminary reviews shall be reviewed by JAXA representatives when required.</p>
2.2.6.5 Material Review Board (MRB)	(Title)
<p>2.2.6.5.1 Membership</p> <p>The Material Review Board (MRB) shall be comprised of at least a representative of the contractor's quality assurance department, a representative of the contractor's engineering department, which is responsible for design of nonconforming articles, and a JAXA representative. Each member may designate one or more agents. The board members of the contractor and their agents shall possess the authority and technical expertise adequate to determine actions. The board members of the contractor and their agents shall be approved by JAXA representatives. When determining the actions, opinions of associated departments of the contractor shall be referenced.</p>	<p>JIS Q 9100 paragraph 8.7 "Control of Nonconformity Output" includes requirement for acceptance of nonconforming products with implementation of use-as-is or repair. JIS Q 9100 paragraph 8.7 also requires the design responsibility department's approval and customer approval in case of deviation from constructed requirement, i.e. the basics of MRB system are included in JIS Q 9100 requirement.</p> <p>Since the MRB system in which JAXA participates to determine actions is a matter to be clarified, MRB membership is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.6.5.2 Responsibility</p> <p>The Material Review Board (MRB) shall perform the following:</p> <ul style="list-style-type: none"> (1) Determine the actions of the nonconforming articles or materials based on the results of adequate analysis and investigation. And confirm that proper actions have been implemented according to the decisions made. (2) Ensure that appropriate and effective corrective actions are documented on the nonconformance document. (3) Submit the application to JAXA for nonconformance actions requiring JAXA approval according to paragraph 2.2.6.6 of this standard and verify their implementation after JAXA approval is obtained. (4) Ensure that MRB decisions are recorded. 	<p>Although MRB requirements are not specified in JIS Q 9100, MRB, at which JAXA attends to determine the disposition of nonconforming articles, shall be specified. This is the reason why MRB responsibility is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.6.5.3 Action determination by MRB</p> <p>The MRB shall select one of the following for action of nonconforming articles or materials submitted to it.</p> <p>Concurrence of all board members is required to select any disposition other than scrap. The MRB shall consider the effects of the nonconformance regarding the purposes of article usage, check the record of disposition on previous nonconformance applied to identical articles, and consider the opinions of experts when determining dispositions.</p> <p>(1) Rework (2) Repair (3) Scrap (4) Use-As-Is (5) Return to suppliers (6) Recommendation to JAXA: If use-as-is or repair is recommended as a disposition of the nonconforming articles or materials that affects its function, performance, safety, reliability or etc. and it is not appropriate for the MRB to judge, the contractor shall submit the recommendation to JAXA according to paragraph 2.2.6.6 of this standard.</p>	<p>Although MRB requirements are not specified in JIS Q 9100, MRB, at which JAXA attends to determine the disposition of nonconforming articles, shall be specified. This is the reason why disposition determination by MRB is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.6.6 Application to JAXA</p> <p>The contractor shall apply to JAXA for a waiver in accordance with JMR-006, "Configuration Management Standard", where applicable to paragraph 2.2.6.5.3 (6) of this standard. The application shall include application details, reasons and the MRB's recommendations, and shall be approved by JAXA through MRB.</p>	<p>The contractor shall not use dispositions of use-as-is or repair, unless specifically authorized by the customer, if the nonconformity results in a deviation from the contract requirements according to paragraph paragraph8.7, "Control of Nonconforming Output" of JIS Q 9100. And, nonconforming outputs need to the customer informed, and/or authorization obtained for acceptance under concession.</p> <p>Since (waiver) application to JAXA is specified in JMR-006, "Configuration Management Standard", the application to JAXA is specified as JAXA-specific requirement.</p>
<p>2.2.6.7 Confirmation on action implementation</p> <p>The contractor's quality assurance department shall confirm that the action of the nonconforming articles or materials shall be implemented as determined in the preliminary reviews and the MRB.</p>	<p>It is specified as JAXA-specific requirement that the contractor's quality assurance department shall confirm the disposition implementation. The contractor shall maintain the records of actions taken to the nonconformities according to JIS Q 9100.</p>

JAXA-specific Requirements	Rationale
<p>2.2.6.8 Corrective actions</p> <p>Considering the severity and the affected area of the nonconformance, the contractor shall organizationally notify or report to associated organizations who may implement the same corrective action. The contractor shall also make confirmation of corrective action implementation.</p>	<p>The contractor shall take action to eliminate the causes of nonconformities of product and quality management system according to paragraph 10.2, "Nonconformity and Corrective Action" of JIS Q 9100. In paragraph 8.7.1 ""8.3, "Control of Nonconforming Product" of JIS Q 9100, it is noted that parties requiring notification of nonconforming output (product).</p> <p>Corrective actions are specified as JAXA-specific requirement to conduct firm information expansion to prevent recurrence of nonconformance, when the nonconformance occurs in part or component.</p>
<p>2.2.6.9 Measures to prevent the recurrence of serious quality problems</p> <p>If a serious quality problem occurs, the contractor shall immediately prepare a report concerning the prevention of the recurrence of serious quality problems, obtain the signature of the person responsible for the quality system, and submit it to the Safety and Mission Assurance Department of JAXA, according to CQM-103003, "Procedure for Preparing a Report Concerning the Prevention of the Recurrence of Serious Quality Problems".</p>	<p>Requirement for submission of report concerning the prevention of the recurrence of serious quality problems is JAXA-specific. This is the reason why measures to prevent the recurrence of serious quality problems are specified as JAXA-specific requirements.</p>

JAXA-specific Requirements	Rationale
<p>2.2.6.10 Material Review Board at supplier</p> <p>The contractor may, with approval of JAXA representative, delegate the MRB responsibility for the applicable articles or materials to suppliers. In such a case, the contractor shall review and confirm the MRB results at the supplier's MRB as part of the procurement control.</p>	<p>Although the requirement for delegation of the MRB responsibility to suppliers is not specified in JIS Q 9100, JAXA has required the delegation for a long time and the delegation has been implemented. Since the delegation requirement conforms to supply chain management in JIS Q 9100, MRB at supplier is specified as JAXA-specific requirement.</p>
<p>2.2.7.1 Utilization of JAXA database</p> <p>The contractor shall submit the following nonconformance data for input into the electronic database system designated by JAXA. The contractor shall also utilize the JAXA database for nonconformance control at facilities.</p> <p>(1) Major nonconformance at the development and production phases shall be reported to the Critical Design Review.</p> <p>(2) Nonconformance submitted to MRB</p>	<p>Although requirements concerning to utilization of JAXA database are not specified in JIS Q 9100, JAXA database is important for nonconformance control (including analysis and horizontal development). This is the reason why utilization of JAXA database is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.7.2 Utilization of "QUALITY HIYARI-HATTO" data</p> <p>When a QUALITY HIYARI-HATTO event occurs, the contractor shall collect, analyze, and use QUALITY HIYARI-HATTO data to prevent nonconformance. To do so, the contractor may refer to JERG-0-020, "HANDBOOK FOR METHOD OF "QUALITY HIYARI-HATTO" DATA APPLICATION".</p> <p>The contractor shall report regularly or as necessary concerning QUALITY HIYARI-HATTO events that may seriously affect the development schedule, costs, or interface when ordered by JAXA representative.</p> <p>If an approach equivalent to those described in this handbook or a superior approach is available, it may be used. In that case, too, the contractor shall report to JAXA representative as described above.</p>	<p>Utilization of "QUALITY HIYARI-HATTO" data is important to prevent nonconformance. Although utilization of "QUALITY HIYARI-HATTO" is considered to be described in paragraph 10, "Improvement" of JIS Q 9100, the utilization is not specified. This is the reason why utilization of "QUALITY HIYARI-HATTO" is specified as JAXA-specific requirement.</p>
2.2.8 History management of articles and document packaging	(Title)

JAXA-specific Requirements	Rationale
<p>2.2.8.1 Records of articles</p> <p>The contractor shall prepare and maintain the records of each article to be delivered in order to control the history of the articles. Each record shall identify the pertinent articles and be prepared starting from the lowest level of assembly, and recording the sequence of fabrication, inspection, and test operations, as well as storage and transportation, as well as identify the recorder and his/her post. The record shall either include the following or reference other documents:</p> <ul style="list-style-type: none"> (1) As-designed configuration data Baseline configuration, approved changes, and deviations (2) As-built configuration data Parts list, drawings, specifications, changes, deviations, waivers, and identification data (3) Fabrication history Assembly and disassembly instructions and histories of coordination, repair, rework, or exchange (4) Inspections and test records Specifications, procedures, results, and variables data (5) Nonconformance records Nonconformance descriptions and actions (6) Cumulative operating time or cycles Operating time or cycles of tests and storage duration 	<p>Documented information (quality records) are required in paragraph 7.5 of JIS Q 9100. Although no detailed description of the specific quality record is in JIS Q 9100, it is a matter that should be clarified as a JAXA specific requirement. This standard does not require the submission of all records. Documentation Data package or test report is comprised of a part of the records of articles and the contractor shall submit the documentation data package or test report as required by contract.</p>

JAXA-specific Requirements	Rationale
<p>2.2.8.2 Documentation Data package</p> <p>When submission of the documentation data package with shipment is specified in the contract, the contractor shall attach the data including component list, equipment log, or nonconformance historical log, as well as necessary documents for identification, maintenance, corrosion prevention and handling of the articles to be shipped. The documentation data package shall include the historical logs of the items whose records are particularly effective for quality assurance, in addition to those of the items identified as reliability control items according to JMR-004, "Reliability Program Standard". The contractor shall coordinate with JAXA representative beforehand and determine the items to include the historical logs in the documentation data package. The packages or containers for storing or shipping the end-items shall display the locations of the documentation data package as necessary. The documentation data package attached to the JAXA-furnished articles and JAXA properties shall be maintained to the extent necessary.</p>	<p>The contractor shall ensure that all documents required to accompany the product are present at delivery according to paragraph 8.6 "Release of products and services" of JIS Q 9100. Since the submission of documentation data package is required by JAXA in some cases, documentation data package is specified as JAXA-specific requirement.</p>

JAXA-specific Requirements	Rationale
<p>2.2.9 Retention of quality records</p> <p>The contractor shall identify quality records to be retained and define the retention periods of the quality records conferencing with JAXA, and shall retain the quality records for investigation determining the cause of nonconformance in operation phase after delivery. Quality records to be retained shall include electronically managed records and supplier's quality records as necessary.</p>	<p>Check of quality records is important for investigation determining the cause of nonconformance in launch-preparation, launch, and mission operation phase after delivery. This is the reason why it is specified as JAXA-specific requirement that the contractor shall identify quality records to be retained and define the storage periods of the quality records considering analysis on nonconformance after delivery. The contractor shall identify quality records to be retained considering importance of the records. It is assumed that the contractor coordinates with JAXA and obtains JAXA's approval about the quality records to be retained and specifies the records in planning documents, for example.</p> <p>The contractor shall establish a documented procedure to define the controls needed for the retention of records according to paragraph 7.5.3 "Control of documented information".</p>