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PROGRAM PROCEDURE

PPR.NGCTR.003.21

Requirements for NGCTR Program Partners

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ROLES

Role	Organisational unit
Approver	NGCTR Program Manager
LH-OS section Owner	NGCTR Data Manager
Document Owner	NGCTR Program Manager
Stakeholders	NGCTR Quality Assurance NGCTR Risk Management NGCTR Experimental Operations NGCTR Chief Design NGCTR Industrial Engineering NGCTR Procurement NGCTR Customer Support & Training

CHANGES LOG

Issue	Approval Date	Main changes	Affected paragraphs
00	22nd June 2021	First issue	N/A
01		Updated list of reference documents. Introduced form PPR.NGCTR.003.21_F01 in place of form QRS-115_F01. Corrected requirement for the management of records.	§§ 6.2.3, 6.3.6.3, 7, 8.1

REFERENCE DOCUMENTS

Documents level	Document code (, paragraph) and title
External Documents	
Mandatory	EN 9100
Guidelines	-
Higher Level LH-OS Documents	PPR.NGCTR.001.21 NGCTR Program Management Plan QRS01 Quality Requirements for Suppliers
Connected LH-OS Documents	QRS-101 First Article Inspection QRS-107 Management of Non-Conforming Articles QRS-108 Supplier Quality Plans QRS-115 Requirements for Design & Development Suppliers QRS-116 Software Development – Quality Requirements QRS-117 Complex Electronic HW – Quality Requirements

CONTENTS

1 PURPOSE 4

2 APPLICABILITY 4

3 EFFECTIVE DATE 4

4 OWNERSHIP 4

5 ACRONYMS, DEFINITIONS AND ABBREVIATIONS 4

6 REQUIREMENTS 6

6.1 GENERAL REQUIREMENTS 6
6.1.1 Partner organization 6
6.1.2 Planning 7
6.1.3 Sub-tier supplier requirements 7
6.2 DESIGN PROCESS PHASES 7
6.2.1 Preliminary design 8
6.2.2 Detail design 9
6.2.3 Compliance demonstration 10
6.2.4 Flight authorization 11
6.3 DESIGN SPECIFIC REQUIREMENTS 12
6.3.1 Documentation requirements 12
6.3.1.1 Detail Technical Specification 12
6.3.1.2 Qualification Program Plan (QPP) 12
6.3.1.3 Qualification documents 13
6.3.2 Design Reviews 16
6.3.3 Control of design changes and configuration management 17
6.3.3.1 General requirements 17
6.3.3.2 Changes to the contractual technical specification or equipment specification 17
6.3.3.3 Management of design changes 18
6.3.4 Identification and marking 18
6.3.4.1 Identification of parts and equipment 18
6.3.4.2 Equipment containing software / Airborne Electronic Hardware (AEH) 19
6.3.4.3 Special identification 19
6.3.5 Critical parts management 20
6.3.5.1 Part, equipment or system classified by LH Technical Specification 20
6.3.5.2 Part, equipment or system with functions classified by LH Technical Specification 20
6.3.5.3 Management of critical parts 20
6.3.6 Test Article Conformity (TAC) 20
6.3.6.1 General 20
6.3.6.2 Conformity to the applicable design data 21
6.3.6.3 Test article representativeness and Test Authorization Form 22
6.3.6.4 Non-conformity management 22
6.3.6.5 TAC for equipment with provisional P/N 23
6.3.7 Design Data Set (DDS) 23
6.3.8 Technical support 23
6.4 ACCESS 23
6.4.1 Access to facilities 23
6.4.2 Access to documentation 24

7 RECORDS 24

8 FORMS AND ANNEXES 24

8.1 FORMS 24
8.2 ANNEXES 24

9 APPENDICES 24

1 Purpose

The purpose of this program procedure is to define the requirements to be applied by (Core) Partners performing design and design validation activities within the NGCTR Program. Such activities aim to demonstrate that:

- the Partners' design complies with LH specified requirements;
- items manufactured in conformity with the Partners' design comply with LH specified functional requirements and are safe for flight.

The requirements included in this program procedure are the result of a tailoring of LH procedure QRS-115 "Requirements for Design & Development Suppliers". The intent of such tailoring activity is to optimize the output requested of Partners and align it to the objectives of the NGCTR Program[1].

2 Applicability

This program procedure applies to all (Core) Partners within the scope of the NGCTR Program.

The procedure does NOT apply to legacy AW609 items utilized on the NGCTR Technology Demonstrator.

3 Effective date

July 2021

4 Ownership

Products and Programmes, in coordination with the other relevant stakeholders, is accountable for managing the deployment of the process, enablement and ongoing improvement.
All process stakeholders are expected to work according to the principles, rules and the processes defined in this document.

5 Acronyms, definitions and abbreviations

AEH	Airborne Electronic Hardware
AR	Analysis Report
ATP	Acceptance Test Procedure
ATR	Acceptance Test Report
CDR	Critical Design Review

[1] Since the purpose of the NGCTR Program is the production and operation of a Technology Demonstrator, there is no need for "full qualification" activities.

CMP	Configuration Management Plan
CoC	Certificate of Conformity
COMO	Coordination Memo
COTS	Commercial Off The Shelf
CPE	Chief Project Engineer
DDP	Declaration of Design and Performance
DDS	Design Data Set
EFA	Experimental Flight Activity
FRR	Flight Readiness Review
LH	Leonardo Helicopters
NGCTR	Next Generation Civil Tilt Rotor
P/N	Part Number
PDR	Preliminary Design Review
QP	Quality Plan
QPP	Qualification Program Plan
QTP	Qualification Test Proposal
QTR	Qualification Test Report
S/N	Serial Number
SCD	Source Control Drawing
TRR	Test Readiness Review

Catastrophic failure
Failure condition that would result in multiple fatalities to occupants of the aircraft, fatalities of incapacitation of the flight crew, or result in loss of the aircraft.

Critical part
A part, the failure of which could have a catastrophic effect on the aircraft, and for which critical characteristics have been identified which must be controlled to ensure the required level of integrity.

Non-critical part
A part, the failure of which does not result in a catastrophic event.

(Core) Partner
Company, enterprise, research organization or consortium selected through a "call for proposals" process within the Clean Sky 2 Programme, which participates in the NGCTR Program under the leadership / coordination of Leonardo Helicopters.

Significant part / equipment
A part or equipment is considered "significant" if at least one of the following conditions occurs:
a) the part / equipment is identified by a LH P/N
b) the part / equipment is classified as *critical*
c) the part / equipment is not classified as *critical* but it has functional requirements that need design validation activities

d) the part / equipment derives from the modification of an already approved design (such as certified in accordance with TSO / ETSO, military approved or COTS) and is identified by a LH P/N

Significant parts / equipment are always identified by a LH P/N and defined within a LH technical document (such as a Technical Specification or Source Control Drawing). *Significant* parts / equipment require dedicated validation activities and the issue of a DDP. Software deliverables are always considered *significant* parts.

Non-significant part / equipment
Part / equipment included in a system that does not meet the conditions defined for *significant* part / equipment. The validation of *non-significant* parts / equipment is made as part of the validation of the related system.

Sub-tier Supplier
Company to which the Partner has decided to outsource part or all of the activities required by a contract.

Technology Demonstrator
Aircraft produced by integrating the technologies (parts, equipment or systems) developed within the NGCTR Program into a legacy AW609 aircraft, in order to perform flight demonstration that the objectives of the NGCTR have been met.

For general definitions, please refer to EN ISO 9000, EN 9100 and IAQG Dictionary.

6 Requirements

6.1 General requirements

6.1.1 Partner organization

Each Partner shall have the proper roles and responsibilities assigned within its organization in order to ensure compliance of its design process and design outputs with LH technical requirements and the requirements of this program procedure.

Within its organization the Partner shall have defined processes for:

- design and development;
- classification of parts, including the management of critical parts;
- showing compliance with design requirements;
- design change management;
- non-conformity management;
- technical documents control;
- Sub-tier Suppliers management.

6.1.2 Planning

The Partner shall issue a Quality Plan (QP) in accordance with QRS-108, and submit it to LH for approval within 60 days from the signature of the implementation agreement or prior to Preliminary Design Review (PDR), whichever comes first, unless otherwise agreed with Leonardo Helicopters.

The QP shall describe the Partner's organization and its processes (ref. para. 6.1.1), and how they meet the NGCTR Program requirements. In particular, the following shall be included in the QP, as pertaining to the design process:

- a description of the Engineering organization with particular reference to NGCTR Program;
- identification of the technical focal points interfacing with LH Engineering;
- a matrix of compliance with the requirements of this program procedure; any exception to comply with the program procedure requirements shall be properly justified;
- list of the Sub-tier Suppliers involved in the program and criteria for their management and surveillance;
- any other NGCTR Program requirement specified in the implementation agreement.

6.1.3 Sub-tier supplier requirements

Each Partner is responsible towards LH for compliance with the requirements of the relevant implementation agreement, even when the Partner outsources part of the contracted activities to Sub-tier Suppliers.

In such cases the Partner shall:

- ensure that its Sub-tier Suppliers are qualified in accordance with LH requirements;
- flow down the requirements of this program procedure to its Sub-tier Suppliers;
- ensure that its Sub-tier Suppliers comply with the requirements of this program procedure.

6.2 Design process phases

The whole design process, as tailored to fit with the objectives of the NGCTR Program, is shown in Figure 1 below.

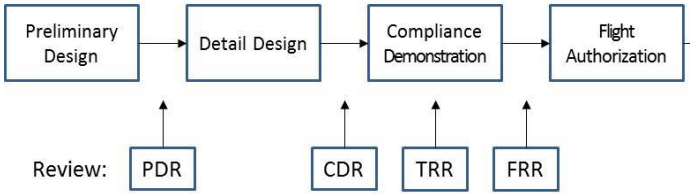

Figure 1

The design process can be further tailored on the basis of type and complexity of the item being developed, provided that exceptions are approved during PDR or in a dedicated Design Review (ref. paragraph 6.1.2).

The outputs of the design process phases are verified during Design Reviews, held with the purpose of evaluating the ability of the design to meet the specified requirements. The positive completion of a Design Review is a necessary condition to pass from a process phase to the next.

The design process phases, including the related outputs / deliverables to be produced at the Design Reviews, are described in the following subparagraphs. The table below lists the submission criteria for the documents submitted during the Design Reviews.

Submission criteria	Level of LH approval defined in the contract
Approval	The document shall be formally approved by LH authorized personnel
Available	The document shall be made available for LH Engineering activities
Review	LH approval is **not** required but comments can be raised
Information	LH approval is **not** required

6.2.1 Preliminary design

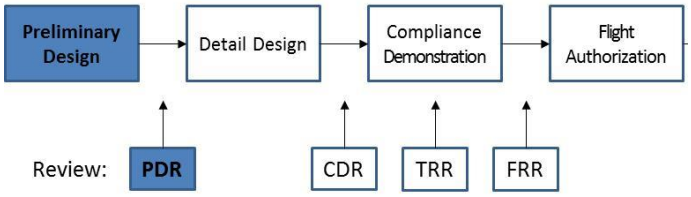

Figure 2

The Partner will receive the following documents from LH Engineering, as inputs of the Preliminary Design phase:

- a Technical Specification or equivalent document (e.g. Source Control Drawing – SCD) for each part or equipment to be developed and validated; or
- a System Technical Specification for the development and validation of an aircraft system.

During the Preliminary Design phase the Partner shall define:

- Detail Technical Specifications for *significant* parts or equipment, or drawing specifications for simple components, in case the Partner is developing an aircraft system;
- assembly / interface drawings and/or 3D models for components of the system;
- Qualification Program Plan (QPP) with the list of documents to be issued, providing evidence of compliance with the requirements of LH specification;
- Quality Plan (QP) in accordance with paragraph 6.1.2;
- Configuration Management Plan (CMP)
- list of critical parts or equipment (in case an aircraft system is being developed) and a critical part list for each piece of equipment;
- a detailed plan for the activities to be conducted during the program, with particular reference to:
    - the sequence of design process phases;
    - planned time for Design Reviews;
    - planned dates for validation activities;
    - deliverable documents and planned issue dates;
    - manufacturing of mock-ups, if applicable;
    - manufacturing of prototypes, if applicable.

The output of the Preliminary Design phase includes the document listed in the table below, to be verified at PDR.

	Document	Submission criteria	LH responsible
1	Detail Technical Specification	Approval	LH Engineering
2	Quality Plan	Review Approval	LH Engineering LH Quality
3	Qualification Program Plan	Approval	LH Engineering
4	Configuration Management Plan	Approval	LH Engineering
5	Assembly / interface drawing and/or 3D model (to be included in the specification documents upon approval)	Approval	LH Engineering
6	Critical equipment list (preliminary)	Review	LH engineering
7	Critical Parts List (preliminary)	Review	LH Engineering
8	Safety / weight / reliability analysis (preliminary)	Review	LH Engineering

6.2.2 Detail design

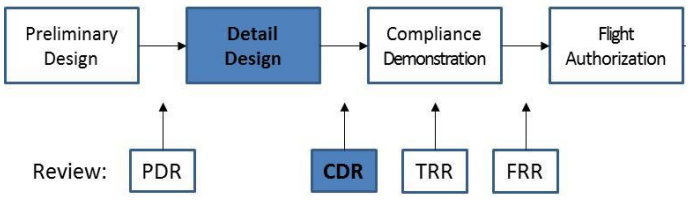

Figure 3

During the Detail Design phase the Partner shall develop the part / equipment / system, defining details of the individual components and the test procedures.

Upon completion of the Detail Design phase, and prior to the first validation test or flight clearance, the Partner shall hold the Critical Design Review (CDR) with the purpose to verify the correct implementation of the design, the completeness of the applicable design documents, and to define the basic configuration (i.e. Baseline Configuration).

During the CDR the documents listed in the table below shall be verified.

	Document	Submission criteria	LH responsible
1	Part List or Design Data Set	Approval	LH Engineering
2	Assembly / interface drawing and/or 3D model	Approval	LH Engineering
3	Drawing / 3D model for components	Review	LH Engineering
4	Acceptance Test Procedure (first issue)	Approval	LH Engineering
5	Vendor Item List (VIL – list of bought-out items purchased by the Partner)	Review	LH Engineering
6	Critical equipment list (final)	Review	LH Engineering
7	Critical Parts List (final)	Review	LH engineering
8	Design Data Set	Approval	LH Engineering
9	Safety / weight / reliability analysis	Approval	LH Engineering
10	Stress analysis	Approval	LH Engineering
11	Preliminary Maintenance Manual / Installation Manual / Mandatory Maintenance Requirements / Fault Check / Troubleshooting	Approval	LH Engineering

6.2.3 Compliance demonstration

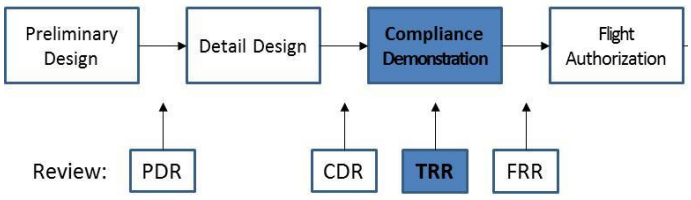

Figure 4

During this stage the Partner shall, as applicable based on the content of the QPP:

- issue the appropriate Qualification Test Proposals (QTP);
- issue analysis reports, calculations, design justifications, etc.;
- produce and make available in accordance with the contractual scheduling, the test articles to be subjected to laboratory testing.

If the testing is conducted at LH laboratories, the Partner shall make available all of the necessary evidence to demonstrate the conformity of the test article to the applicable

design data, and issue a preliminary[2] Declaration of Design and Performance (DDP – ref. form QRS-115_F03) that LH will approve before the delivery of the test articles.

If the laboratory testing is conducted under the Partner's responsibility, instead, the Partner shall:

- make available the test articles with the related conformity documentation and DDP;
- complete and make available the Test Authorization form (ref. PPR.NGCTR.003.21_F01) and the documentation needed for the test.

A Test Readiness Review (TRR) shall be performed before either of the following events, whichever occurs first:

- beginning of the test at Partner's facilities, or
- delivery of part / equipment / system to LH for laboratory testing not under Partner's direct control

The table below lists the documents to be verified during TRR.

	Document	Submission criteria	LH responsible
1	Qualification Test Proposal	Approval	LH Engineering
2	Compliance reports (analysis, justification, calculation, safety assessment, etc.)	Approval	LH Engineering
3	DDP (preliminary)	Approval	LH Engineering
4	Test Article Conformity (TAC)	Approval	LH Engineering
5	Certificate of Conformity	Available	LH Engineering
6	Test Execution Authorization form	Approval	LH Engineering

6.2.4 Flight authorization

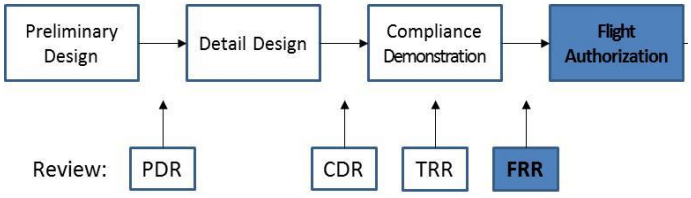

Figure 5

Prior to first flight the Partner shall issue a DDP[3] and all the documentation necessary to determine the flight clearance of the part, equipment or system. These documents shall be submitted to LH for the Flight Readiness Review (FRR), as listed in the table below.

[2] The DDP needs to be at least "for rig use only" or "ground use only" to be acceptable.
[3] The DDP needs to be at least in "EFA" status to be acceptable

	Document	Submission criteria	LH responsible
1	DDP	Approval	LH Engineering
2	Design reports (including limitation justifications as necessary)	Approval	LH Engineering
3	ATR (including limitation justifications as necessary)	Approval	LH Engineering

After achieving flight clearance of the part, equipment or system, the Partner shall support the flight test activities conducted by LH with the Technology Demonstrator (ref. para. 6.3.8).

6.3 Design specific requirements

6.3.1 Documentation requirements

The following subparagraphs define the requirements, with which the Partner has to comply when producing deliverable technical documents.

6.3.1.1 Detail Technical Specification

As described in para. 6.2.1, based on LH System Technical Specification the Partner shall issue a Detail Technical Specification for each *significant* part or equipment included in the system. In case of simple components the Partner can issue a specification drawing, instead.

When outsourcing to one or more Sub-tier Suppliers, for each of them the Partner shall issue a design specification equivalent to LH Technical Specification in terms of technical and quality contents. This specification shall clearly define the envelope of requirements the Sub-tier suppliers have to comply with.

6.3.1.2 Qualification Program Plan (QPP)

The Partner shall issue a QPP with the purpose of planning and tracking the activities that will be performed and the documentation that will be issued in order to show compliance with the design requirements. For this reason the QPP shall include a Compliance Matrix as shown in the example below.

Spec. para.	Applicable QPP reference	Means of Compliance	Type of requirement			Notes and MoC justification
			F	EFA	Q	

In the table above the "type of requirement" can be:

- **F:** acceptance requirement (ATP);
- **EFA:** requirement to be complied with in order to obtain "Experimental Flight Clearance";

- **Q:** final qualification; within the scope of the NGCTR Program it is not required to show compliance to this type of requirements, however the item shall be designed to meet these requirements so that subsequent full qualification activities would be successful; the proper design justification for this shall be presented by the Partner at the Design Reviews.

Possible Means of Compliance (MoC) include:

- **By Test:** tests will be performed to show compliance in accordance with Test Proposals (ref. para. 6.3.1.3.1); the related Test Reports (ref. para. 6.3.1.3.2) will be issued as evidence of compliance;
- **By Analysis:** compliance will be shown by means of analytical calculations; the related Analysis Report (ref. para. 6.3.1.3.3) will be issued as evidence of compliance;
- **By Similarity:** the compliance will be shown through a technical justification demonstrating that the requirements had been already verified by testing an similar part, equipment or system, and that any difference with the latter does not impact the results of the tests (ref. para. 6.3.1.3.4);
- **By Design:** compliance is intrinsically ensured by the design and drawing requirements;
- **By Inspection**: compliance is determined by inspecting the part, equipment or system in the cases where it cannot be determined by evaluating the design data.

When compliance is shown "by Design" or "by Inspection", the evidence of compliance will also include verification of the relevant Test Article Conformity (TAC).

6.3.1.3 Qualification documents

Based on the activities planned in the QPP, the Partner shall prepare a set of documents to provide evidence of compliance with the design requirements. These qualification documents shall be clearly traceable to the P/N of the part, equipment or system, for which they constitute evidence of compliance.

All of the qualification documents shall include their own Compliance Matrix, which shall be clearly traceable to the Compliance Matrix included in the QPP. Moreover the contents of the qualification documents shall be divided into paragraphs clearly referencing the relevant MoC.

6.3.1.3.1 Qualification Test Proposal (QTP)

A QTP shall include at least the following information:

- description of the part, equipment or system, and related P/N;
- number of specimens to be tested[4], test conditions, test parameters and test equipment;
- acceptance criteria for the test results;

[4] For each item used in qualification test, the specific test for which the item will be used should be specified.

- laboratory in charge of the test.

The Compliance Matrix to be included in the QTP shall be as per the example below.

Spec. para.	QTP para.	Test Condition	Acceptance criteria	Type of requirement			Notes
				1	2	…	

6.3.1.3.2 Qualification Test Report (QTR)

A QTR will be issued for each QTP, including at least the following information:

- P/N of the item used for testing with the related description, configuration status (drawing issue or modification status), and the applicable Technical Specification;
- evidence of conformity to the applicable design data (i.e. TAC) for each item used for testing;
- copy of the Test Authorization form signed by LH;
- justifications for any difference in the configuration between the items tested and the items for which compliance is intended to be demonstrated, if any;
- date and place of testing;
- configuration of test equipment, tools, etc.;
- laboratory qualification status;
- reference to the applicable paragraph of the QTP for each requirement tested;
- test results as compared with the acceptance criteria, including any deviation and/or limitation with respect to the requirements.

The test results in the QTR shall be listed in a table as in the example below.

Specification para.	QTR para.	Compliance Status	Deviation / Limitation

6.3.1.3.3 Analysis report (AR)

The Analysis Report (AR) shall include at least:

- details of the analyses performed, such as calculation methods, assumptions, etc.;
- results of the analyses / calculations;
- deviations / limitations with respect to the requirements.

The results of the analysis shall be shown in a table similar to the example below.

Specification para.	AR para.	Description	Deviation / Limitation

6.3.1.3.4 Similarity justification

The Partner may report justifications of similarity in one or more documents, which shall at least include the following information:

- the already qualified P/N used as reference for the similarities;
- the reference QTR of the already qualified P/N;
- a detailed description of the similarity criteria, and justifications for any possible deviation.

6.3.1.3.5 Acceptance Test Procedure (ATP)

The Partner shall issue a testing procedure for each *significant* P/N, to be used in order to identify anomalies or malfunctions of any unit produced of that P/N. If some performance is associated with system or subsystem functions, then the appropriate system or subsystem ATP shall be provided.

The ATP shall include at least:

- the applicable P/N;
- physical inspections to ensure compliance with the design, such as identification, dimensions, weight, etc.;
- functional tests to ensure the proper functioning of the part / equipment, including any environmental test conditions, and electrical testing, as applicable;
- a list of the parts, equipment or system to be used in the execution of the ATP, including software;
- the form to report the results of the ATP (i.e. Acceptance Test Report – ATR);
- a troubleshooting procedure.

6.3.1.3.6 Maintenance data (preliminary)

Within the scope of the NGCTR Program LH will perform flight test activities using a Technology Demonstrator. Therefore LH is responsible to ensure the safe operation and airworthiness of the aircraft and any part or equipment therein.

In order to support LH in the operation and maintenance of the Technology Demonstrator, and consistently with the requirement of LH specification, the Partner shall provide all the data necessary for Level 1 and Level 2 maintenance activities.

The levels of maintenance are defined as follows:

- *Level 1 (Organizational Level):* maintenance activities performed to keep the aircraft available, such as:
  - servicing activities,
  - pre- and post-flight inspections,
  - functional checks,
  - troubleshooting,
  - preventive maintenance,
  - corrective maintenance (replacement of parts),
  - software loading,
  - simple modifications;
- *Level 2 (Intermediate Level):* maintenance activities such as:
  - repairs down to module and subassembly level,
  - minor structural repairs of the airframe,
  - scheduled inspections,
  - modifications;

- *Level 3 (Depot Level):* all maintenance activities beyond the capabilities of Level 1 and Level 2; these activities are generally performed at the manufacturer's facilities.

6.3.1.3.7 Declaration of Design and Performance (DDP)

A DDP is always required for each *significant* P/N being qualified. Moreover, where applicable, one or more DDPs may be requested for traceability of requirement integration at system or subsystem level. Evidence of the validation of parts of the system other than *significant* P/N is implicitly provided through the System DDP.

If the Partner outsources the design or validation of one or more *significant* parts or equipment, then the related DDPs shall also reference the name of the design responsible Sub-tier Supplier and the P/Ns assigned by the Sub-tier Supplier. When a Sub-tier supplier performs and/or is in charge of validation activities, then the DDP and all other supporting documents shall be signed by the design responsible Sub-tier supplier and the Partner for approval, and by LH Engineering.

The DDP shall be prepared in accordance with form QRS-115_F03. The DDP shall be revised and re-submitted to LH Engineering for approval in the following cases:

- the progress of the validation activities causes a change in how the P/N can be used (ref. box 21 of form QRS-115_F03, e.g. rig use only, ground use only, EFA, etc.) or changes in the limitations;
- a change has occurred in the referenced applicable Technical Specification;
- a change has occurred in the referenced ATP.

6.3.1.3.8 Delivery documentation

Any part / equipment delivered to perform ground tests / flight tests in order to show compliance shall be accompanied by the following documents:

- certificate of conformity, as required by the relevant purchase order;
- TAC approved by LH Engineering, or reference to an already approved, previously delivered TAC (ref. para. 6.3.6), if applicable;
- ATR, if applicable.

6.3.2 Design Reviews

The design process is controlled by means of Design Reviews, as shown in Figure 1.

The Partner shall notify the Design Review to LH Engineering, and deliver all the related documentation, at least 10 working days in advance to the planned Design Review date. LH Engineering has the right to attend these reviews.

A minute shall be prepared for each Design Review, listing all of the actions raised, the related action owners and planned closure dates.

A Design Review can be formally closed and the following phase can be started only when all actions recorded have been closed and the relevant documentation has been approved.

6.3.3 Control of design changes and configuration management

6.3.3.1 General requirements

The Partner shall have a system in place for changes management that ensures control of the changes in the requirements during the development phase and subsequently control of the baseline configuration after CDR.

The Partner shall demonstrate that its system is capable of:

- an adequate configuration control, including:
  - identification of parts through P/N,
  - traceability from specification requirements to the design of the equipment P/N and its relevant components,
  - traceability of minor design changes[5];
- an adequate classification of changes to the baseline configuration;
- tracking of changes via an internal form including:
  - reason for change,
  - classification of changes and relevant justification,
  - P/N affected by the change,
  - impact on the design data (i.e. technical documents to be issued or updated);
- re-validation as necessary.

The Partner shall have a procedure for the management and approval of design changes in accordance with the criteria specified above. Reference to the Partner's applicable procedures shall be included in the Quality Plan.

Unless waived by the contract, the configuration management process shall be described in the CMP.

6.3.3.2 Changes to the contractual technical specification or equipment specification

Changes to the contents of a Technical Specification can be originated by a request from LH Engineering or from the Partner. Such requests can occur either during the development phase (before CDR) or after the definition of the baseline configuration.

When the Partner needs to introduce changes in LH Technical Specification, such request shall be made formally through the issue of a Specification Change Notice (SCN) in accordance with form QRS-115_F04.

The Partner shall use the SCN form also in the event of a change of P/N in the configuration of the deliverable part / equipment, regardless of the reason for the change.

[5] The tracking of minor changes should not impact the P/N, but use an index such as "issue", "amendment" or "modification status".

LH Engineering will perform a technical evaluation of the change together with an analysis of the impact of such change onto each part, equipment or system. If the proposed change is accepted LH Engineering will revise LH Technical Specification.

Changes to the Technical Specification proposed by LH will be anticipated to the Partner via SCN prior to the revision of the Technical Specification.

6.3.3.3 Management of design changes

The Partner shall submit design changes to LH Engineering for acceptance if there is an impact on fit, form and function (i.e. major change).

The Partner shall prepare its own "change form" (ref. para. 6.3.3.1) and submit it to LH Engineering in accordance with the following rules:

- changes classified as major: the Partner shall send the SCN, the "change form" and all attached documentation to LH Engineering; the change shall not be implemented until approved by LH Engineering, as evidenced by LH signature on the SCN;
- changes classified as minor (impacting LH Technical Specification requirements): the Partner shall send the "change form; LH Engineering reserves the right to request, within 30 days, a re-evaluation and re-classification of the change; if no request is received from LH Engineering, the Partner can proceed with the change;
- any other minor change (e.g. correction of clerical mistakes, etc.): the Partner shall send a Coordination Memo (COMO) to LH Engineering for information only; the Partner can proceed with the implementation of the change.

All of the records of changes notifications to LH and evidence of LH approval shall be retained by the Partner, and made available for LH checks and evaluations.

6.3.4 Identification and marking

6.3.4.1 Identification of parts and equipment

All deliverable parts or equipment (end items) shall be identified in accordance with LH Technical Specification.

Parts and equipment shall be permanently and legibly marked with the following data:

- name or logo of the manufacturer[6] as defined in the applicable design data;
- P/N of the part or equipment as defined by the designer[7] in the applicable design data;
- modification status, i.e. revision of the applicable detail drawing or Part List;

[6] Intended as the company which is responsible for the manufacturing
[7] Intended as the company which is responsible for the design, be that the Partner or a Sub-tier Supplier

- manufacturer's S/N, or batch number if serialization is not required;
- Partner's P/N in case the Sub-tier supplier is responsible for the design;
- LH P/N as defined in LH Technical Specification;
- description of the part or equipment;
- manufacturing date;
- identification number of Concessions / Deviation Permits, if marking is required (ref. para. 6.3.6.4).

6.3.4.2 Equipment containing software / Airborne Electronic Hardware (AEH)

For equipment containing any type of software, the P/N shall include indications on the combination of hardware and software. Any changes to the software shall have an impact on the P/N and be managed as major changes (ref. para. 6.3.3.3).

The identification code of the software shall not be marked on the equipment. Software change identification performed adding an additional label referencing software configuration without changing end item P/N is strictly forbidden.

For the development of software and complex hardware refer also to QRS-116 and QRS-117.

6.3.4.2.1 Identification of part, equipment or system through provisional P/N

Programmed parts, equipment or systems identified by means of provisional P/Ns shall be marked through:

- name plate in accordance with para. 6.3.4.1;
- additional plate with the provisional P/N.

Provisional P/Ns shall be stricken out when superseded. In any case the additional plate bearing the stricken out provisional P/N shall be maintained on the related part, equipment or system for the duration of the validation tests.

6.3.4.3 Special identification

In case of delivery of parts or equipment declared "NOT FOR FLIGHT" due to their configuration or non-conformities (ref. para. 6.3.6.4):

- the parts or equipment shall be identified by means of a 20 mm width red band (compatibly with the item size);
- CoC and Log Card, if applicable, shall clearly state "NOT FOR FLIGHT".

This requirement does not apply to components for which the "NOT FOR FLIGHT" limitation is a temporary condition due to the progress of compliance demonstration, since the limitation may be lifted based on the test results.

6.3.5 Critical parts management

6.3.5.1 Part, equipment or system classified by LH Technical Specification

When LH Engineering has defined in the LH Technical Specification a classification for the part (either critical or non-critical) on the basis of safety analyses and the overall functionality of the aircraft, the Partner shall classify and manage the related part part, equipment or system accordingly.

6.3.5.2 Part, equipment or system with functions classified by LH Technical Specification

In this case LH System Technical Specification defines the functions of the system, the loss of which might cause dangerous situations, and classifies them as:

- Catastrophic,
- Hazardous, or
- Major.

After defining the system composition, the Partner shall perform a safety analysis on the functions of the system components, identifying their role in the functional failures defined in the System Technical Specification, and classify the components accordingly.

6.3.5.3 Management of critical parts

When a part is classified as critical, the Partner shall:

- include the "CRITICAL PART" statement (or equivalent) in the drawings of critical parts, systems or equipment;
- identify the critical characteristics in the manufacturing drawings / 3D models of critical parts, systems or equipment;
- ensure product traceability by means of serialization.

The Partner shall be able to trace the Serial Number (S/N) of critical components to the S/N of higher level assembly, and maintain a critical component list for critical parts, systems or equipment.

Changes to the production process of critical parts shall be approved by LH Engineering prior to implementation, and TAC shall be repeated, in the following cases:

- change of: raw material, critical operation, special process, numerical control program, special tools, particular part of a tool (e.g. a change in the casting scheme);
- change or new layout of the manufacturing site.

6.3.6 Test Article Conformity (TAC)

6.3.6.1 General

For any part, equipment or system used for compliance showing testing, the Partner shall issue a Certificate of Conformity (CoC) to the applicable design data.

For each *significant* P/N the evidence of conformity will be collected in a report called TAC. TAC shall be conducted in accordance with QRS-101, similarly to a First Article Inspection. In particular, the TAC plan and, subsequently, the TAC report have to be approved by LH Engineering Chief Project.

For any item to be used for testing there shall be evidence that:

- the items are in compliance with applicable design data;
- any non-compliance with applicable design data has been evaluated as not having impacts on the test results.

6.3.6.2 Conformity to the applicable design data

The Partner shall establish a process to ensure conformity of the parts manufactured for testing, with the applicable design data.

TAC shall be conducted in accordance with QRS-101, and include at least:

- a complete dimensional check;
- Acceptance Test Report, as applicable;
- any other inspection required by the applicable design data;
- evidence of implementation of manufacturing procedures and inspections;
- destructive test results;
- qualification of special processes;
- any other verification necessary to demonstrate the Partner's ability to manufacture parts in compliance with the applicable design data.

The Partner can define any additional inspection to be performed in order to ensure compliance demonstration.

The TAC report shall be submitted to LH Engineering for approval. In addition to the evidence collected in the TAC report, the following data shall be made available to LH Engineering:

- the set of drawings and/or 3D models necessary to check the completeness of the report;
- Part List;
- copies of control specifications for any critical characteristic and/or evidence that those specifications are equivalent to those used by LH.

Parts cannot be delivered to LH laboratories or used for testing in the Partner's laboratories prior to TAC approval.

TAC shall be performed or repeated in the following cases:

- at the first test for showing compliance for the specific P/N, regardless of the site of the test;
- in case of significant changes in the manufacturing process; in this case a revision of the TAC is required;

- in case of changes to the equipment configuration, with a change of P/N; in this case a new TAC has to be issued.

6.3.6.3 Test article representativeness and Test Authorization Form

When TAC is approved, the related equipment / parts can be used for test.

The item to be used for testing shall be accompanied by a CoC, issued on the basis of the applicable TAC results and further inspections[8], as applicable.

Any non-conformity shall be managed as per paragraph 6.3.6.4. Non-conformities shall be approved by LH Engineering prior to the start of the test to evaluate that they have no impact on the test results.

For tests to be performed at Partner's (or its Sub-tier supplier's) premises, the Partner shall prepare a Test Authorization form in accordance with PPR.NGCTR.003.21_F01, with the evidence described above attached. For test to be performed under LH responsibility, the Partner shall send to LH Engineering the evidence of conformity for the part delivered.

6.3.6.4 Non-conformity management

The supplier shall reference any non-conformity affecting the test item in the related Certificate of Conformity.

As defined in QRS-107, non-conforming items shall be managed in accordance with the Partner's procedures as recognized by LH.

Unless the Partner decides to scrap the non-conforming part, the Partner shall:

- submit to LH Engineering a Concession form for evaluation and approval, in accordance with form QRS-107_F01;
- ensure that the non-conformity notification includes:
  - identification of the part for traceability,
  - identification of the root cause,
  - evidence of any corrective action taken;
- reference all non-conformities and applicable repair drawings to the Certificate of Conformity of the affected part, attaching copy of the documentation;
- mark the part with LH concession number, if so required by LH Engineering disposition.

The item shall not be delivered or tested (if the Partner is in charge of testing) prior to LH Engineering approval of the Concession and completion of the related corrective action.

[8] ATP, dimensional checks, etc.

6.3.6.5 TAC for equipment with provisional P/N

When a change is introduced in programmed equipment managed with provisional P/N, a sheet shall be added to already issued TAC, providing a description of the changes with respect to previous configuration.

6.3.7 Design Data Set (DDS)

The Partner shall issue a document defining the Design Data Set (DDS) at CDR, and maintain it updated in case of major changes to the configuration or to documents referenced in the configuration.

The document defining the DDS shall be prepared in accordance with form QRS-115_F05, and submitted to the following approval loop:

- the signature of the person responsible for the Partner's Configuration Control is the evidence that the drawing tree included in the document is the currently issued one and is managed in accordance with the procedure for change management (ref. para. 6.3.3);
- the signature of the Partner's Chief Designer provides evidence that the reported configuration is:
  - the applicable one,
  - up to date, and
  - suitable for the issue of manufacturing documentation;
- the signature of LH Chief Designer represents LH acceptance of what is reported in the DDS document, as well as the assurance of correspondence between the Partner's P/Ns and LH P/Ns;
- the signature of LH CPE freezes the applicable design data package to be used in production for the issue of manufacturing documents.

At the end of the approval loop, LH will return the DDS document to the Partner for filing.

6.3.8 Technical support

Upon request the Partner shall provide technical support to LH Engineering for:

- resolution of defects found on the relevant part, equipment or system after delivery;
- investigation and resolution (including containment and corrective actions, as applicable) of occurrences resulting from flight activities of the Technology Demonstrator.

6.4 Access

6.4.1 Access to facilities

The Partner shall grant LH access to all the facilities where activities related to NGCTR Program are performed.

6.4.2 Access to documentation

The Partner shall grant LH access to the documentation deemed necessary to meet the objectives of the NGCTR Program.

7 Records

The records introduced with this procedure shall be retained in accordance with the requirements of QRS01.

8 Forms and annexes

8.1 Forms

This program procedure makes use of the following forms introduced by QRS-115, and available in Leonardo website:

- ~~QRS-115_F01: Test Authorization~~
- QRS-115_F02: Coordination Memo
- QRS-115_F03: Declaration of Design and Performance
- QRS-115_F04: Specification Change Notice
- QRS-115_F05: Design Data Set
- PPR.NGCTR.003.21_F01: Test Authorization Form (R&D Programme)

8.2 Annexes

Not applicable

9 Appendices

Not applicable