

QRS-AWHERO-001_Appendix 1

REQUIREMENTS FOR DESIGN AND DEVELOPMENT SUPPLIERS OF AIRBORNE AND GROUND STATION EQUIPMENT

Issue Date: June 2022

Issue: 01

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ROLES

Role	Organisational unit
Author / Document Owner	LH Engineering
Approver	[see CPR.000.09]
LH-OS section Owner	[see CPR.000.09]
Key Stakeholders	Supplier AWHERO Engineering AWHERO Procurement & Supply Chain AWHERO Quality & Certifications AWHERO Supplier Quality Assurance
Other Stakeholders	AWHERO Quality Control AWHERO Material Planning & Control AWHERO Manufacturing Engineering AWHERO Production & Experimental A/C Build

CHANGES LOG

Issue	Approval Date	Main changes	Affected paragraphs
01	June 2022	QRS_AWHERO_002 Issue A has been moved to Appendix 1 of QRS_AWHERO_001	N/A

REFERENCE DOCUMENTS

Documents level	Document code (, paragraph) and title
External Documents	
Mandatory	EN 9100:2018; EN9110:2018; EN 9120:2018; ISO 9001:2015
Guidelines	AS 9102, Aerospace First Article Inspection Requirements ISO 10006, Quality Management in projects
Higher Level LH-OS Documents	QRS-01, Quality Requirements for Supplier QRS-101, First Article Inspection QRS-107, Management of Non-Conformances, Deviation Permits and Continued Airworthiness QRS-116 Software Development, Quality Requirements for Suppliers QRS-117 Complex Electronic Hardware, Quality Requirements for Suppliers QRS-122 Supplier Component Maintenance/Operating Manuals management
Connected LH-OS Documents	CPR.095.18 Supplier Quality Plans CPR.080.16 Configuration Management 100-50-153 Procedure for "Declaration of Design and Performance" (DDP) management during development phase and pre series 100-50-167

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LIST OF ANNEXES:

The followings annexes are a part of the document:

Annex A	Test execution Authorization Form
Annex B	Coordination Memo Form
Annex C	Declaration of Design and Performance Form
Annex D	Specification Change Notice Form
Annex E	Design Data Set Form

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1 SCOPE

This document defines the mandatory requirements for Suppliers of activities concerning design, qualification and requalification of parts, equipment and systems that *shall* be installed, certified/qualified on LH UAV.

These activities have the purpose to demonstrate:

- The compliance of each part, system or equipment to the Airworthiness applicable requirements;
- The compliance of each part, system or equipment to the Functional design requirements (Functional Qualification);
- The ability of the manufacturing process to produce items in conformity with the Design Data Set (Manufacturing Process Qualification), through FAI.

A part, system or equipment is qualified only when both Functional and Manufacturing Qualification Processes have been successfully completed.

2 APPLICABILITY

This document is applicable to suppliers engaged in the development, design, qualification and/or certification activities of new parts, systems or equipment's. It also includes any re-qualification activities and modification to already qualified P/N's.

The activities are concluded when the Supplier is informed by LHEO that the Certification process or the modification thereto, has been completed.

This procedure is applicable to all LH UAV programs, unless otherwise specified in this document.

This procedure *could* be supplemented by the following, as :

- QRS-116, for new development of Software for airborne systems and equipment;
- QRS-117, for Complex Electronic Hardware used for airborne systems, sub-systems and equipment.

Table 1 highlights the subjects of this procedure that must be applied depending on component classification and/or the activities correlated to the component design and development.

This document is not applicable for LH STANDARD parts.

Table 1 – Procedure Subjects VS Supplier typology

D = Supplier engaged with SCDD; M = Supplier engaged with SCDM; Q = Supplier responsible for demonstration of compliance to the requirements; T = (E)TSO Supplier; “S = Off-The-Shelf Supplier; P = Partially applicable; refers to the note and/or the relevant paragraph; X = Complete applicability

N.B.: For suppliers of “D” or “M” typology also responsible for demonstration of compliance, the requirements defined for “Q” typology shall be added.

Subjects	Applicability					Notes
	D	M	Q	T	S	
General requirements (§5.1)	X	X				For the Organization responsible for (E)TSO products, or equivalent, the recognition of the Production Organization it is under the Authority responsible of (E)TSO approval.
General requirement of Quality System (§5.1.1)	X	X			X	
Supplier organization (§5.1.2)	X	X			P	For “S” only underlined bullets in the paragraph are required
Program requirements (§5.1.3)	X	X				
Sub-tier suppliers requirements (§5.1.4)	X	X			X	
Process phases (§5.2)	X	P				For “M” only marked subparagraphs in this table are applicable
General (§5.2.1)	X	X				
Process description (§5.2.2)	X	X				
Preliminary Design (§5.2.2.1)	X	P				For “M” only underlined parts in the paragraph are required
Detailed Design (§5.2.2.2)	X	P				For “M” only underlined parts in the paragraph are required
Test Authorization (§5.2.2.3)	X	P	X		X	For “M” only underlined parts in the paragraph are required
Flight authorization (§5.2.2.4)	P		X		P	“D” shall give to LHEO all design data necessary to prepare a DDP or equivalent document for flight authorization.
Qualification (§5.2.2.5)	P		X		P	For “D” to evaluate the applicability on the basis of paragraph contents; can request a

Subjects	Applicability					Notes
	D	M	Q	T	S	
						contribution to prepare the documents of LHEO responsibility.
Continued Airworthiness (§0)	X	P	X	X	X	For "M" only marked subparagraphs in this table are applicable
Production (§5.2.2.6.1)	X	X	X	X	X	
Continued Airworthiness rules (§5.2.2.6.2)	X	P	X	X	X	For "M" only underlined parts in the paragraph are required
Design specific requirements (§5.3)	X	X	X			
Documentation requirements (§5.3.1)	X	X	X			
Detailed Technical Specification (§5.3.1.1)	X				X	
Qualification Program Plan (QPP) (§5.3.1.2)	P		X		X	"D", if requested by LHEO, shall contribute to issue the document and/or supply the necessary technical information.
Qualification documents (QD) (§5.3.1.3)	P		X		X	"D", if requested by LHEO, shall contribute to issue the document and/or supply the necessary technical information.
Qualification Test Proposal (QTP) (§5.3.1.3.1)	P		X			"D", if requested by LHEO, shall contribute to issue the document and/or supply the necessary technical information.
Qualification Test Result (QTR) (§5.3.1.3.2)	P		X		X	"D", if requested by LHEO, shall contribute to issue the document and/or supply the necessary technical information.
Analysis report (AR) (§5.3.1.3.3)	P		X			"D", if requested by LHEO, shall contribute to issue the document and/or supply the necessary technical information.
Similarity justification (§5.3.1.3.4)	P		X			"D", if requested by LHEO, shall contribute to issue the document and/or supply the necessary technical information.

Subjects	Applicability					Notes
	D	M	Q	T	S	
Acceptance Test Procedure (ATP) (§5.3.1.3.5)	X	X				
Maintenance Manual (§5.3.1.3.6)	X	X				
Declaration of Design and Performance (DDP) (§5.3.1.3.7)	X			X	X	
Delivery documentation (§5.3.1.3.8)	X	X		X	X	
Design Review (DR) (§5.3.2)	X	X				
Changes control/Configuration Management (§5.3.3)	X	X				
General requirements (§5.3.3.1)	X	X				
Modification to the contractual technical specification or to equipment specification (§5.3.3.2)	X	X				
Management of design changes (§5.3.3.3)	X	X			X	
Management of Production Process Changes (§5.3.3.4)	X	X			X	
Interim changes to programmed equipment (§5.3.3.5)	X					
Data exchange (§5.3.3.6)	X	X				
Configuration Management	X	X			P	

Subjects	Applicability					Notes
	D	M	Q	T	S	
(§5.3.4)						
Identification and marking (§5.3.5)	X	X		X	X	
Equipment/parts identification (§5.3.5.1)	X	P		X	X	For “M” only underlined parts in the paragraph are required
Equipment containing SW/AEH (§5.3.5.2)	X	X		X	X	
Sub-component identification (§5.3.5.3)	X	X		X	X	
Special identification (§5.3.5.4)	X	P		X	X	For “M” only underlined parts in the paragraph are required
Critical Parts (§5.3.6)	X	X		X		
Definition (§5.3.6.1)	X	X		X		
Part/System/Equipment classified by LH Technical Specification (§5.3.6.2)	X	X				
Management of Critical Parts (§5.3.6.3)	X	X				
Test Article Conformity (TAC) (§5.3.7)	X	X			X	
General (§5.3.7.1)	X	X				
Conformity to the Applicable Technical Data (§5.3.8)	P	X		X	X	“D” shall define only the requirements necessary to demonstrate the conformity of the test article
Test article representativeness and TAF	X	X	X		X	

Subjects	Applicability					Notes
	D	M	Q	T	S	
(§5.3.9)						
Non conformity management (§5.3.10)	X	X		X	X	
TAC for equipment with temporary P/N (§5.3.11)	X	X				
Design Data Set (DDS) (§5.3.12)	X	X	X		X	
DDS contents (§5.3.12.1)	X	X	X		X	
DDS approval (§5.3.12.2)	X	X	X			
DDS filling (§5.3.12.3)	X	X	X			
Access and data visibility (§5.4)	X	X	X			
Access to the sites (§5.4.1)	X	X	X		X	
Documentation (§5.4.2)	X	X	X		X	

3 RELATED DOCUMENTS

3.1 Applicable Documents

- [1] **5000 Series** *Design Modification Engineering (DME) Regulatory Articles*
- [2] **AQAP 2110** *NATO Quality Assurance Requirements for Design, Development and Production*
- [3] **100-50-167** *Management of unincorporated changes to technical reports "Document Change Notice"*

3.2 Reference Documents

- [4] **CPR.095.18** *Supplier Quality Plans*
- [5] **100-50-153** *Procedure for “Declaration of Design and Performance” (DDP) management during development phase and pre series*
- [6] **CPR.080.16** *Configuration Management*

4 ACRONYMS AND DEFINITIONS

4.1 Acronyms

AEH	Airborne Electronic Hardware
ATP	Acceptance Test Procedure
ATR	Acceptance Test Report
CDR	Critical Design Review
CM	Configuration Management
CMP	Configuration Management Plan
CoC	Certificate of Conformity
COMO	Coordination Memo
COTS	Commercial Off The Shelf
CS	Certification Specification
UAS	Unmanned Aircraft Systems
UAV	Unmanned Aerial Vehicle

4.2 Definition

Commercial-Off-The-Shelf (COTS) items

- *Commercially available items intended by design to be procured and utilized without modification (e.g., common electronic components);*
- *Commercially available applications sold by vendors through public catalogue listings;*
- *Commercially available applications, defined by industry recognized specifications and standards, sold through public catalogue listings.*

Designer

A company that is proprietary of the “Know How” of the part, system or equipment; all the drawings are issued with the relevant logo and signatures of responsible managers of this Company. The Company has the full responsibility of the Design Process and methods used to show compliance to LH’s specs.

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Designer Part Number

It is the P/N assigned to the supplier that has the design responsibility. When the supplier subcontracts the design of one or more parts, systems or equipment to other organizations, the P/N shall be assigned by the first-tier supplier.

Deliverable Part, system or equipment

Part, system or equipment defined by LHEO as individually manageable by the end user and / or at Product level. The P/Ns of these parts, systems or equipment are reflected in the LH Part List, meanwhile the subcomponents are managed and coded by the supplier that manages and maintains under control the configuration. These parts, systems or equipment are divided in:

- STANDARD
- TSO/ETSO
- OFF THE SHELF
- P/N to be qualified

Part Numbers "To Be Qualified"

For this type of part, system or equipment two classes are defined:

1) New development equipment/part: *when the part (at least one of the following cases occurs):*

- a) has been already TSO certified or Military approved or OFF THE SHELF but modified and identified by an LH P/N*
- b) has been classified "CRITICAL"*
- c) is not "CRITICAL" but with functional requirements for which design validation activities are required*
- d) has been identified with a LH P/N*
- e) Is not classified as above categories, therefore similar to standard or simple part (racks, pipes, wires, screws, etc...), but is part of a system design whose responsibility is recognized to a Supplier.*

The "new development equipment/part" group is subdivided into two subgroups:

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- I) **“Significant” P/N to be qualified** [a), b), c) and d) bullet point]: for each “significant” part the LH P/N shall be defined and an LH specific document shall be issued (Technical Specification or Source Control Drawing). For these equipment/parts, the supplier shall provide evidence of compliance to the technical requirements applicable by issuing of DDP approved by LHEO¹. The SW deliverable is always considered a significant P/N.
- II) **“Not significant” P/N to be qualified** [e) bullet point]: these parts will be qualified as part of system without the issuing of a dedicated DDP.

2) New development equipment that will achieve a TSO certification

In this case, the requirements for new development equipment shall be applied until the TSO certification has been achieved. After this, the equipment will be managed as TSO after the demonstration that the relevant requirements, the characteristics and the ATP approved by the competent Authority, are equivalent and in compliance with LHEO requirements.

Product

According to the definitions of EASA rules, “Product” is intended an object for which is foreseen a type certification as: aircraft, engine, and propeller. The components that form a “Product” are defined “Parts”, “Systems” or “Equipment”.

Standard part

A part is considered as a “standard part” where it is designated as such by the design approval holder responsible for the product, part or appliance, in which the part is intended to be used. In order to be considered a “standard part”, all design, manufacturing, inspection data and marking requirements necessary to demonstrate conformity of that part should be in the public domain and published or established as part of officially recognised Standards.

LH Note: *some examples of officially recognised Standards are NAS, AN, MS. The common parts designed by LH are not considered as standard parts.*

Supplier

A Subcontractor, recognized by LH able to supply one or more of the following activities/processes:

- development*
- design*
- qualification*

of new parts, systems or equipment as well as of modifications of their qualified configurations, in compliance with the LHEO Specification defined in the contract.

(European) Technical Standard Order - (E)/TSO

¹ SCDMs are excluded. For this kind of parts DDP is never required.

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A (E)TSO is a minimum performance standard for specified materials, parts, and appliances used on civil aircraft. When authorized to manufacture a material, part, or appliances to a (E)TSO standard, this is referred to as (E)TSO authorization. Receiving a (E)TSO authorization is both design and production approval.

5 REQUIREMENTS

5.1 General Requirements

The Supplier *shall* meet the requirements defined within this chapter. The Supplier *shall* be aware, organized and able to comply (and support LH to comply) to the relevant specifications that are called up within this procedure (i.e. Part 21 UAV, EN 9100 etc.).

5.1.1 General Quality System requirements

The Supplier *shall*, for all activities described in this document, be organized according to the requirements listed in QRS-01 document and applicable modules and *shall* be approved by the LH "Supplier Quality Assurance".

5.1.2 Supplier organization

In order to meet the requirements specified in this document, the supplier *shall* have a Design Organization, that includes the following capabilities:

- One or more technicians, delegates by the Technical Director, who have the responsibility to receive and control the contents of the technical documents
- One or more technicians responsible for testing activities, including verification of compliance of the test articles
- Personnel authorized to sign the technical documents
- A process for design
- A process for classification and management of Critical Parts
- A process of demonstrating compliance with design requirements
- A process for change management
- A process for approval of non-conformities on manufactured parts
- A process for continuing airworthiness
- A process for managing and filing of technical documentation
- A process to guarantee that the drawings and the technical documentation are always shared with LH for long term archiving

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The above should be defined within the Suppliers Quality Management System and process and identified within the Quality Plan. Compliance with these requirements shall be verified by LH as part of Supplier Quality Audit activity.

5.1.3 Program requirements

Following the acquisition of a contract for the development of new part, system or equipment, the Supplier *shall* issue a Quality Plan (QP), as required in ref.[4].

In compliance with the requirements of the present document, the Supplier *shall* describe, in the relevant section of the QP, how the Design Organization, and its relevant processes, meets the specific requirements of the program.

In particular, as far as the D&D process is concerned, the QP *shall* define:

- The manager responsible to declare the compliance of the product to the applicable/approved design data;
- The technical Supplier Focal Point;
- Any specific LH program requirements implemented contractually required by technical specifications and Statement of Work.
- Design and Data deliverables required by LH as part of the programme. These can be physical parts, Hardware, Software or drawings, models, documentation or other artefacts as required.

5.1.4 Sub-tier supplier requirements

The Main Supplier is always responsible towards LH for the compliance with contract requirements also in case it delegates part of the activities to a Sub-tier supplier.

5.2 Process Phases

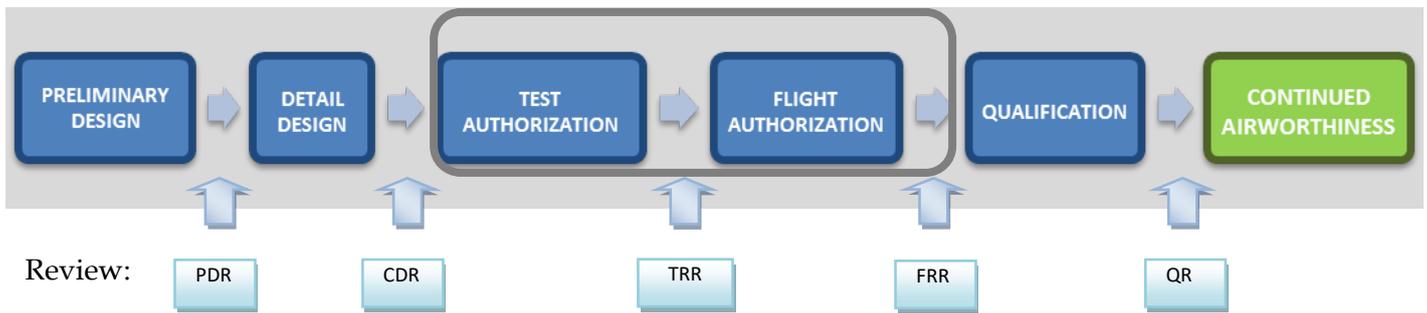
5.2.1 General

Following paragraphs describe the phases of development, design, compliance to the technical requirements, etc. involved in the whole design process.

5.2.2 Process Description

The whole design process is outlined in figure below:

COMPLIANCE DEMONSTRATION



The process described here can be tailored according to type and complexity of the part, system or equipment being developed, providing it is agreed and approved by LHEO at or before the PDR or in a separate dedicated planning review.

The outputs from the process phases *shall* be verified with formal reviews (Design Reviews), whose positive results confirm the completion of all anticipated activities, the due conformity to the applicable standards of the produced documentation and authorize the passage from a phase to the following one.

- **Design and development verification** is taken into CDR activity and will ensure that the design and development outputs have met design and development requirements.
- **Design and development validation** is taken into QR activity and will ensure that the resulting product is potentially capable to meet the requirements of the specified application.

For each phase, the main activities are described, including the documents (work products) to be issued.

The following table identifies the submission criteria listed for the work products/deliverables that are verified during Design Review.

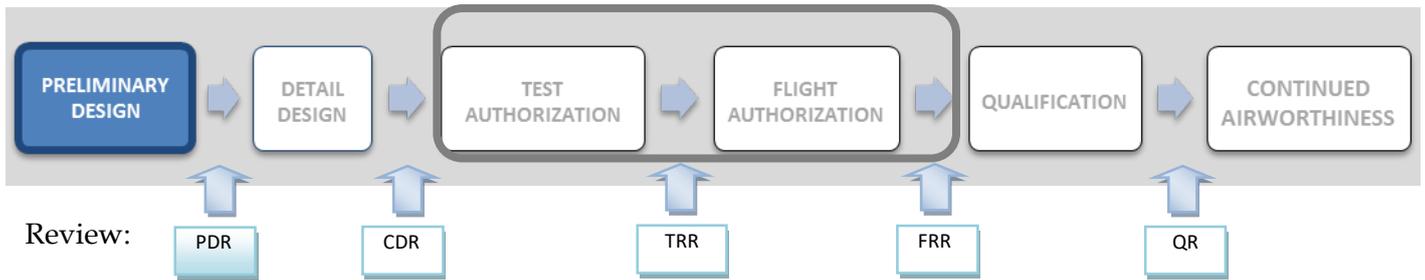
Table 2 - Submission and Acceptance Criteria

Submission criteria	The level of LH approvals defined in each contract
Approval	Work product <i>shall</i> be formally approved by LH deputed people
Acceptance	No LH formal approval required, but work product <i>shall</i> be signed for knowledge
Available	Work product <i>shall</i> be available and verifiable during LHEO activities or progress meetings
Review	No LH formal approval required, but comments can be raised
Information	No LH formal approval required

The TRR is a pre-condition for compliance activities that need Laboratory testing.

5.2.2.1 Preliminary Design

COMPLIANCE DEMONSTRATION



In order to support the Preliminary Design, the Supplier *shall* receive from LHEO:

- A Technical Specification or equivalent document (i.e. Source Control Drawing – SCD) for each part, system or equipment/part to develop and qualify;
- A System Technical Specification for the development and qualification of an UAV system;
- A Process Requirement Document (or equivalent), issued either as independent document or as an annex to a Statement of Work, reporting the working arrangements to be put in place for the coordination between LHEO and the Supplier and the agreed procedures to be used by the Supplier.

Technical Specifications contain all the technical and quality requirements for the equipment/part to be qualified and to which compliance must be given.

The Process Requirement Document customizes for the specific Supplier the following working arrangements:

- LH focal points and contact details;
- Means of communication between the parties;
- Input data from LH;
- Deliverable output from Supplier;
- Data formats;
- Approval workflows inside LH for the different data to be exchanged and relevant authorised signatories;
- Planning and progress reporting to be provided;
- Record Keeping provisions;
- Identification of testing facilities;
- Access to data and facilities to be granted;

This document *shall* also specify the agreed procedures for the following topics, to be used by the Supplier for the execution of the assigned tasks:

- Classification and approval of changes and repairs;
- Configuration control;

- Approval of production deviation (when the supplier is also the manufacturer);
- Coordination of design activities;
- Control of sub-tiers;
- Execution of testing.

The Supplier, after the contract acquisition, *shall* define:

- Assemblies/interfaces drawings and/or 3D models for components of the system (only for equipment in case of single equipment);
- A Qualification Program Plan (QPP) with the list of documents to be issued in order to provide evidence of compliance with the requirements of LHEO specification, organized in a preliminary compliance matrix;
- A Quality Plan (QP), which contents shall be in line with the LH prescriptions;
- A Configuration Management Plan (CMP) or equivalent document, using the form F06 annex to ref. [6].
- The list of critical equipment/parts (only for System suppliers) and a critical part list for each of the relevant equipment;
- A Statement of Work (SOW); the planning tool of all the activities that shall be performed related to the System/Part provision. The SOW shall include, as a minimum the following aspects:
 - the sequence of project development phases;
 - the schedule of project reviews;
 - the qualification activities date of start and end (and subsequent availability of the first qualified item);
 - The requested documents and their issuing dates (drawings issuing deadlines, QTP, QTR, DDP, etc...);
 - the possible Mock-up construction;
 - the possible functional prototypes construction;
 - The availability of pre-series and of subsequent series production.

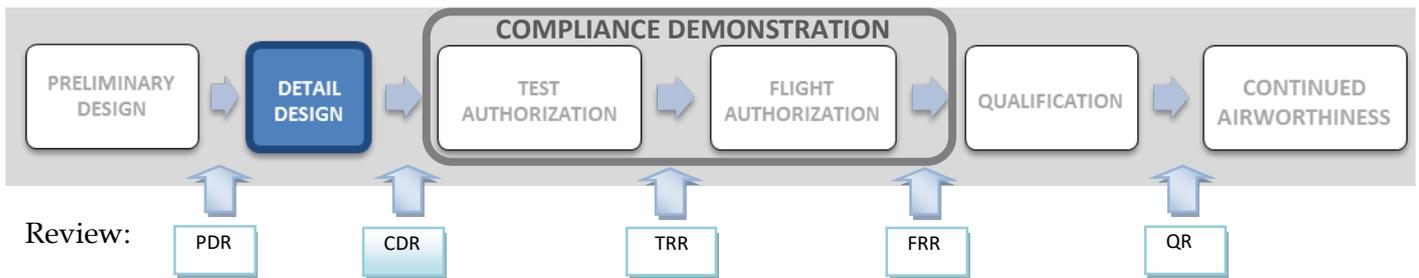
The works products/deliverables in this stage *shall* be verified during the Preliminary Design Review (PDR).

Table 3 – Deliverable Requirement and Authorisation

	Document	Submission Criteria	LH responsible
1	<u>Quality Plan (QP)</u>	Review Approval	LH D&D LH Quality

2	<u>Qualification Program Plan (QPP)</u>	Approval	LH D&D
3	<u>Configuration Management Plan (CMP) or equivalent</u>	Approval	LH D&D (supported by CM/PMO)
4	Interface/assembly Drawing/3D Model (to be approved and included in the specification documentation)	Approval	LH D&D
5	Critical equipment list (only for system; status preliminary)	Review	LH D&D
6	Critical Part list (preliminary)	Review	LH D&D
7	Safety/reliability analysis (preliminary)	Review	LH D&D
8	Weight analysis (preliminary)	Review	LH D&D

5.2.2.2 Detail Design



The Supplier, at this stage, shall develop the part, system or equipment, defining the detail of the individual parts and the test procedure.

When the detailed design has been completed and before the first test qualification or "flight clearance", the Supplier shall perform the Critical Design Review (CDR) to verify the correct implementation of the design, the applicable technical documents and to define the Basic Configuration (Baseline Configuration).

At this stage, in presence of LH EO and LH PO personnel, the technological requirements (defined in Technical specification and/or SCD) of the part, system or equipment shall be verified (through the use of pre-filled EN9102 forms). The compliance to these requirements shall be demonstrated by Supplier through FAI execution.

DDS approval defines the end of CDR. DDS can be only approved after positive verification on supplier planning of FAI activities.

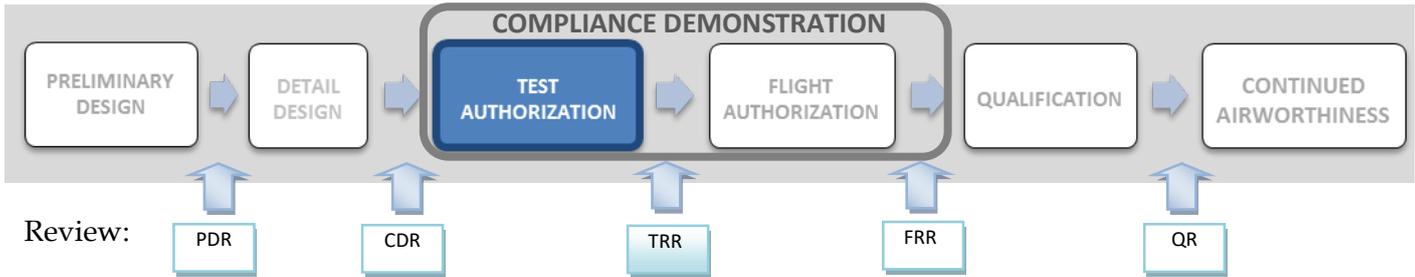
In the Critical Design Review the documents listed in the table below *shall* be verified:

Table 4 – CDR Documents for Verification

	Document	Submission Criteria	LH responsible
1	Part List or Design Data Set (system or equipment where applicable)	Approval	LH D&D
2	Drawing/3D model for components	Review	LH D&D
3	Acceptance Test Procedure (First issue)	Review	LH D&D
4	Sub-tier Item list (list of bought-out items purchased by the Supplier)	Approval	LH D&D
5	Critical Equipment list (final)	Approval	LH D&D
6	Critical Part list (final)	Approval	LH D&D
7	Safety/Reliability analysis	Approval	LH D&D
8	Weight analysis	Approval	LH D&D
9	Stress Analysis	Approval	LH D&D
10	Preliminary Maintenance Manual / Installation Manual / Mandatory Maintenance Requirements / Fault Check / Troubleshooting	Approval	LH D&D
11	<u>Planning of FAI Activities</u>	Review	LH PO Supported by LH D&D
12	<u>Design Data Set</u>	Approval Acceptance	LH D&D LH CPE

	Document	Submission Criteria	LH responsible
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5.2.2.3 Test Authorization



The supplier at this stage, as applicable, *shall*:

- Issue and approve the Qualification Test Proposal report;
- Issue the analysis reports, calculation, design justifications, etc...;
- Produce and make available (within the contract scheduling) the items to be tested in the laboratories under supplier responsibility or LH laboratories, as applicable. In the latter case, it shall make available the necessary documentation to demonstrate the compliance of the test article with the applicable design data and issue a DDP (preliminary) that LH shall approve before the items' delivery.

The supplier, if the tests are conducted in its laboratories, *shall*:

- Make available the test articles with the documentation of compliance;
- Complete and make available the form of "Test Execution Authorization" (ref. Annex A) and the documents necessary for the tests;

The Test Readiness Review (TRR) *shall* be performed before any of the following events, as attested by the first occurring in chronological order:

- Beginning of the test at the supplier facilities;
- Delivery of part, system or equipment to LH for laboratory tests not under the direct control of the supplier.

The documents that *shall* be verified during the TRR are listed in the table below:

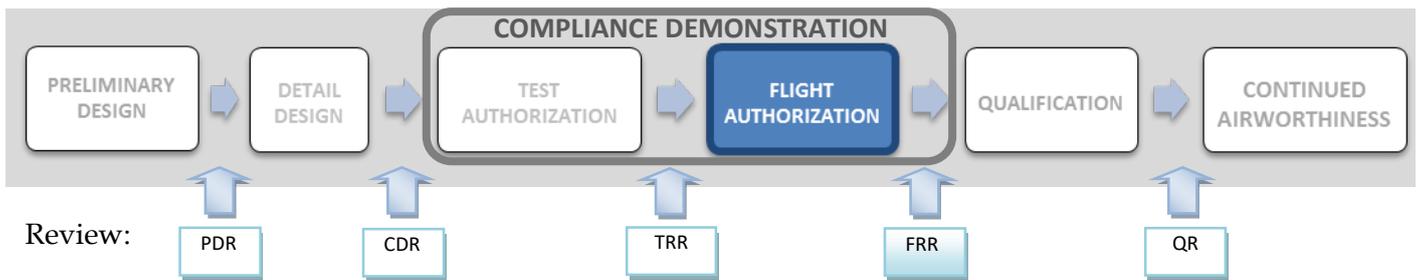
Table 5 – TRR Verification

	Document	Submission Criteria	LH responsible
1	Qualification Test Proposal document	Approval	LH D&D

2	Compliance reports (analysis, justification, calculation, safety assessment, etc.)	Approval	LH D&D
3	<u>Test Article Conformity (TAC)</u>	Approval	LH D&D
4	Certificate Of Conformity	Available	LH D&D
5	Test execution Authorization Form	Approval	LH D&D

With TRR closure, rig and ground tests can be performed.

5.2.2.4 Flight Authorization



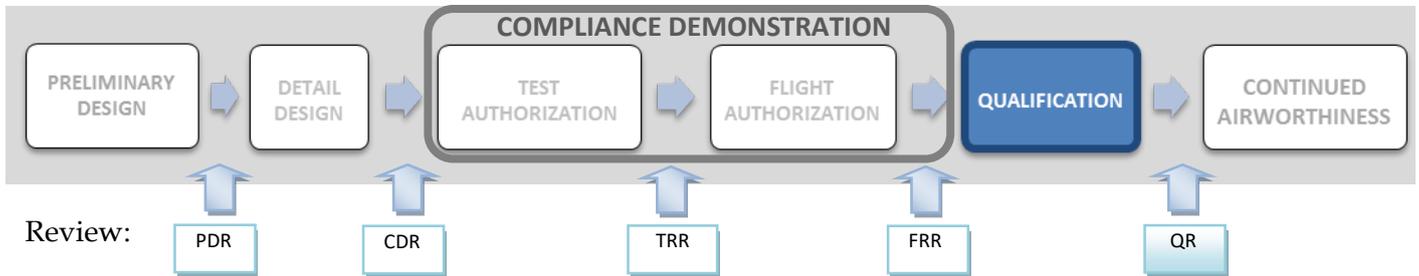
At the first flight clearance, the Supplier *shall* issue the DDP and all documentation necessary to declare the "Flight clearance" of part/equipment and send the documents to LHEO.

Table 6 – Flight Clearance Authorization

	Document	Submission Criteria	LH responsible
1	DDP (preliminary, for EFA)	Approval	LH D&D, CPE (as applicable)
2	Design reports (limits justification, if any)	Approval	LH D&D
3	ATR (with limitation justification, if any)	Approval	LH D&D

With FRR closure, experimental flight tests can be performed by LH.

5.2.2.5 Qualification



At the conclusion of the demonstration of compliance activities, the supplier shall issue the final DDP and all applicable documents. The Qualification Review is the formal moment in order to evaluate the whole qualification process and freeze the contents of documents of compliance.

At this stage all documents, including those of configuration (part list and drawings tree), *shall* be frozen; the table below lists these documents.

The LHEO approval of the DDP establishes the conclusion of the design activities. In addition, for civil programs the conclusion of the certification process by the competent Authority is established by the LHEO issue of SADD document (for POA manufacturers only).

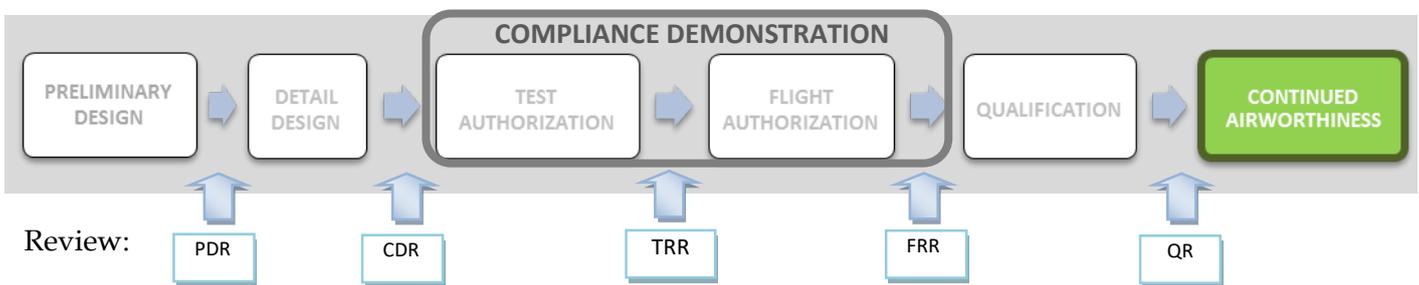
Remark: before the issuance of SADD, the Supplier shall ensure that the latest version of design data has been provided to LH, including any very minor changes implemented after the DDP.

Table 7 – Qualification Documents Verification

	Document	Submission Criteria	LH responsible
1	Qualification Test Results	Approval	LH D&D
2	ATP (final)	Approval	LH D&D
3	Design Data Set (final)	Acceptance	LH D&D
4	DDP (final)	Approval	LH D&D, CPE (as Applicable)
5	Sub-tier Item List (final)	Approval	LH D&D

6	Critical equipment/part list (final)	Approval	LH D&D
7	Production facilities list	Approval	LH D&D
8	Maintenance Manual	Approval	LH D&D

5.2.2.6 Continued Airworthiness



The continued airworthiness phase gathers all activities after the qualification of the equipment/system, and can be divided into the two following activities.

5.2.2.6.1 Production

The series production control of the part, system or equipment will be executed by the LH Production Organization (LHPO) as established by the contract.

The supplier in the first instance *shall* ensure that the part, system or equipment manufactured in series is identical to those used for qualification.

This evidence will be given by the First Article Inspection (FAI) activities on the first production batch that will be done under the control of the LHPO.

The supplier *shall* guarantee that, during the entire period of production, the part, system or equipment/parts will be in compliance with the requirements of the next paragraph.

5.2.2.6.2 Continued Airworthiness Rules

The Supplier, in order to guarantee that the items already delivered and/or those that will be produced in future are in compliance with the original requirements, shall:

- Maintain updated the maintenance documentation applicable to the items (see also QRS-122)
- Manage and control the design and production changes
- Manage the defects resolution (see also QRS-107).

- Manage the outcomes of the field operation of the component, informing LH about involved supplied parts, supporting LH on investigations and containment/corrective actions and granting support and information towards Airworthiness Authorities, if a potential unsafe condition is identified (see also QRS-107).

5.3 Design Specific Requirements

5.3.1 Documentation requirements

The following paragraphs define the requirements for documents that define the suppliers technical competencies.

5.3.1.1 Detailed Technical Specification

The Supplier *shall* issue for each part of the system to qualify a Detailed Technical Specification (Equipment Specification) or, for relatively simple components, a Specification Drawing.

If the supplier uses one or more Sub-tier suppliers, it is recommended the issuing for each of them of a design specification equivalent, in terms of technical and quality contents, to LHEO Technical Specification; this document *should* clearly define the envelope of the requirements to be followed by the Sub-tier suppliers.

5.3.1.2 Qualification Program Plan (QPP)

For each contract, the Supplier *shall* issue the QPP that contains the “Compliance Matrix”.

The QPP document scope is to give evidence of:

- the process traceability, the activities that will be performed, and
- the documents that will be issued in order to demonstrate the compliance with the design requirements of the equipment/parts.

The table below shows an example of Compliance Matrix.

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

Where the type of requirement *could* be:

- **EFA:** requirements to be demonstrated for the “Experimental Flight Clearance”
- **F:** acceptance requirements (ATP)
- **Q:** final Qualification.

The Means Of Compliance (MoC) *could* be:

- **By Test:** the tests will be performed and Test Proposal and Test Result reports will be issued
- **By Analysis:** analytical calculations will be made and an Analysis Report will be issued
- **By Similarity:** a technical justification must demonstrate that the requirements were already verified "By testing" an equipment or systems equivalent and that the differences between the already tested and the new one do not impact the results of the tests
- **By Design:** the requirement is demonstrated automatically because the design and the requirements of the drawing ensure compliance
- **By Manufacturing:** as stated for "By Design"

For the last two MoC, the formal evidence of compliance is also done by the positive verification of the Test Article Conformity.

5.3.1.3 Qualification Documents (QD)

The supplier, on the basis of the information indicated in the QPP, *shall* prepare a set of reports (QD), in order to demonstrate the compliance with requirements. These reports are, for example: the test proposal, test results, analysis reports, similarity's justifications etc.

These documents *shall* always show the P/N of equipment or system for which the demonstration of compliance must be given.

The complete and clear traceability between the "matrix of compliance" of QPP and the number of sub matrix of individual QD is a mandatory requirement; it is also important that the demonstrations shown on the QD is divided into paragraphs and subparagraphs homogeneous for MoC.

5.3.1.3.1 Qualification Test Proposal (QTP)

The QTP *shall* contain, as minimum, the following information:

- Equipment/system description and the relevant P/N;
- Number of specimens to be tested, test conditions, parameters and equipment (STTE);
- Acceptance criteria for the test results;
- Step by step flow of activities, containing detail to acceptance criteria tolerance, conditions, etc.;

The table is an example of a Compliance Matrix to be included in the QTP:

Spec. Para	QTP Para	Test Condition*	Type of requirement			Notes
			1	2	...	

(*) for each item used for qualification tests, indicate which test will be used for.

5.3.1.3.2 Qualification Test Report (QTR)

For each QTP the relevant QTR *shall* be issued containing, at least, the following information:

- The P/N used for testing and the relevant configuration status (drawing issue or Modification Status), the applicable Technical Specification and item description;
- For each item used for testing, evidence of conformity to the applicable technical data (e.g. TAC);
- Copies of the Test Authorization approved by LH, if applicable;
- justification of configuration differences between the items tested and the items of which is to demonstrate compliance with the requirements, if necessary;
- Date and place of testing;
- Configuration of STTE, tools, etc.;
- Qualification status of laboratories;
- For each requirement, the reference to the applicable paragraph of QTP;
- Test results with deviation and/or limitations with respect to the requirements;
- A Compliance Matrix as in the following table:

Specification Para	QTR Para	Description	Deviation/Limitation

5.3.1.3.3 Analysis report (AR)

The Analysis Report *shall* contain:

- Details of the analysis performed such as calculation methods, assumptions, etc...
- Results of the analysis/calculations
- Deviations/limitations with respect to the requirements
- Test results with deviations and/or limitations with respect to the requirement
- A Compliance Matrix as in the following table:

Specification Para	AR Para	Description	Deviation/Limitation

--	--	--	--

5.3.1.3.4 Similarity justification

The supplier can report the justifications "by similarity" in one or more documents; these documents *shall*, at least, contain this information:

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

5.3.1.3.5 Acceptance Test Procedure (ATP)

For all "significant" P/N to be qualified, the supplier *shall* issue a testing procedure in order to identify anomalies or malfunctions of equipment/part produced.

If some performances are associated to functionalities of system or subsystem, the appropriate ATP applied to the system or subsystem *shall* be provided.

The ATP *shall* contain:

- The applicable P/N;
- Physical inspections necessary to ensure compliance with design documentation such as identification, size, weight, etc.;
- Functional tests to ensure the proper functioning of the part including the environmental test conditions and electrical testing (where applicable);
- All the part, system or equipment that *shall* be used for the execution of ATP including the SW test;
- The form to record the results of ATP (Acceptance Test Report - ATR);
- A troubleshooting procedure.

5.3.1.3.6 Maintenance Manual

LHEO, as type certificate holder, has the responsibility to place, in the manuals of the Product, the actions required for the operators, to ensure the normal operations and continued airworthiness of each part/equipment and therefore of the product itself.

The Supplier *shall* prepare and deliver to LHEO, the following documentation and information:

- For first and second level activities, data necessary for maintenance activities; LHEO *shall* endorse this data, including them on an own manual;

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- For third level activities, the equipment Maintenance Manual; these activities cannot be delegated to Operators, but must be performed by the manufacturer. Contents of this manual are under Supplier's responsibility.

The above documentation *shall* be referenced in the appropriate box of DDP

- First Level (or Organisational Level)

The aim of Level 1 maintenance is to keep each Product available. This implies, in case of a malfunction, the quick and easy exchange of components and modules, as well as powerplant replacement.

Level 1 activities are expected to include:

- Servicing activities
- Pre- and post-flight inspection
- Functional checks
- Trouble shooting
- Preventive maintenance
- Corrective maintenance (parts replacement)
- Software loading
- Simple modifications

- Second Level (or Intermediate Level)

The aim of Level 2 maintenance is to maintain at the highest possible level of efficiency the product fleet. This implies, mainly, repair of assemblies and subassemblies replaced at Level 1.

Level 2 activities are expected to include:

- Repairs down to modules and subassemblies
- Minor structural repairs to the airframe
- Scheduled inspections
- Modifications
- Technical assistance to the Level 1 organisation

- Third Level (or Depot Level)

The aim of Level 3 maintenance is to assure the achievement of all repairs and overhaul activities beyond Levels 1 and 2 capabilities. Such activities are generally performed at OEM facilities.

Level 3 activities are expected to include:

- Repairs down to full reconditioning
- Repairs requiring special skills or (test) equipment
- Major structural repairs to the airframe
- Major scheduled inspections
- Modifications and update programmes
- Technical assistance to the Level 1 and 2 organisations

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- Software modifications
- Preservation of complete product.

5.3.1.3.7 Declaration of Design and Performance (DDP)

The DDP is always required for SCDD and certainly when **LH** defines one or more requirements (except for the P/N where **LH** has prepared an SCDM) of the purchased part.

The qualification of deliverable parts of a system, not counted among the Significant P/N to qualify, is implicitly declared by the issue of the System DDP.

The DDP *shall* be revised and resubmitted to LHEO for approval when at least one of the following cases occurs:

- The criticality class of a P/N is changed from Not Critical to Critical;
- Extension of compliance with requirements;
- The design validation activities change the usability of the P/N listed in box 21 of DDP form (ref. Annex C), or there is a change in the limitations;
- The applicable Technical Specification, referenced on DDP, has been changed ("Equipment Specification" for single deliverable or System Specification, in case of System DDP);
- The referenced ATP has been changed;
- Change of at least one document of compliance to the requirements.

The DDP *shall* be prepared according to the form (ref. Annex C).

5.3.1.3.8 Delivery documentation

The equipment/parts which will be delivered to perform the tests to demonstrate compliance *shall* be accompanied by the following documents:

- "Certificate of Conformity" to the applicable design data (with reference to the relevant DDP, if applicable);
- TAC approved by LHEO or reference to the TAC already approved and delivered with previous test articles and, if applicable, ATR.
- Log card (if required);
- Copy of any derogation/non-conformance (Concession / Production Permit).

5.3.2 Design Review (DR)

The control of design process *shall* be performed by means of Design Reviews; the previous figure in §5.2.2 shows the minimum number of Design Reviews to be performed.

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The Supplier *shall* provide the review notification, with delivery of all the relevant documentation, to their formal point of contact within LHEO at least 10 working days before the intended review date. LHEO can require participating in reviews.

Minute & action capture logs *shall* be prepared for each review, reporting all actions, the responsible and the scheduling of their closure.

The minutes of Design Review *shall* be managed such a technical document.

The review can be formally closed and a new phase can be started only when all actions are closed and relevant documentation verified.

5.3.3 Change control/Configuration Management

5.3.3.1 General requirements

The Supplier *shall* have in place a system for the management of the changes that guarantees the control of the evolutions of the requirements during the development phase and subsequently the management of the baseline configuration, after its achievement at the CDR. This *shall* happen both during the demonstration of compliance phase and the production, when the configuration of each part delivered *shall* be attested.

The Supplier *shall* demonstrate that its design system is capable of:

- Ensuring a satisfactory configuration control, this means that:
 - a Part Numbering system *shall* be defined to identify uniquely the parts;
 - a process *shall* be available to ensure traceability from requirements specification to the drawings included the P/N equipment and all relevant components;
 - a code structure, not included in the P/N, *shall* be defined to guarantee the traceability of minor changes (both physical and documental), usually using the "modification status" or "amendment" or equivalent code.
- Evaluate and correctly classify the changes to the baseline configuration
- Provide an internal form to record the changes, stating:
 - reason for change;
 - classification, considering "fit, form and function" criteria or airworthiness criteria as applicable (ref. 5.3.3.4 or 5.3.3.5);
 - justification of classification decision, unless self-evident;
 - P/N affected by the change;
 - generation of new P/N in case of impact on form, fit or function;
 - generation of new "modification status" in case of no impact on form, fit or function;
 - Level of impact on design data (drawings to be amended, ATP, etc...);
- Manage the process of requalification;

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- Manage the system for assigning new identification numbers (P/N, mod status numbers), consistent with the class of the change.

The Supplier must have in place a procedure for the management and approval of changes to the design of the parts, system or equipment supplied to **LH**, in agreement with the criteria reported in this document. The references to the applicable Supplier procedures *shall* be reported in the Quality Plan.

Unless waived by the contract, The process of control/configuration management *shall* be described in a "Configuration Management Plan" (CMP).

5.3.3.2 *Modification to the contractual technical specification or to equipment specification*

Changes to the contents of a Technical Specification (or SCD) can be originated by a request of LHEO or of the Supplier.

They can occur either during the development phase (before the CDR) or after the achievement of the baseline configuration to be used for the demonstration of compliance and the production.

If the Supplier needs to modify one or more content of the **LH** Technical Specification, it *shall* initiate the process of evaluation and after the phase of informal contacts and agreements with LHEO, all traced through the issue of Coordination Memos (COMO), it *shall* request the modification through the issuance of a SCN.

The SCN *shall* be prepared and compiled using the form in Annex D.

The Supplier *shall* use the SCN also in case of Part Number change in the configuration of the deliverable equipment/part, independently from the reason that has generated it.

The **LH** Technical Area in charge *shall* proceed with the technical evaluation of the change and the analysis of the impact of identified change on each part, system or equipment, as described in subsequent paragraphs

A change to the Technical Specification proposed or required by **LH** *shall* be anticipated by the issue of an SCN, otherwise directly managed with the review of the document.

In case of SCN approval, **LH** Technical Area modifies the Technical Specification through its revision or issuing a DCN (as per Ref. [3]) .

If the modifications to the Technical Specification requirements occur before the Critical Design Review (before the achievement of the configuration baseline and the issue of the relevant preliminary Part List) and before the delivery of part, system or equipment or the start-up of any certification activity, the P/N will not change.

5.3.3.3 *Management of Design Changes*

the Supplier *shall* submit design changes to LH for acceptance if there is an impact on fit, form or function.

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5.3.3.3.1 *Change approval*

- **All Changes *shall* be communicated to LH for classification and approval.**
 - For each Change, the Supplier *shall* send to the LH Technical Area in charge to follow the design activity the following:
 - Engineering change order documents, in the format identified in the Quality Plan.
 - The drawings relevant to the change and all the documents proposing or testifying the demonstration of compliance to the applicable Technical Specification requirements, applicable airworthiness requirements (CS paragraphs) and environmental protection requirements. These documents *may* be compliance statements, description reports, analytical substantiation reports, safety analysis reports, test plans/test reports etc.

Changes cannot be implemented until its approval is communicated by LHEO with signature on the SCN.

5.3.3.3.2 *Procedure for the management of changes*

The procedure for management and approval of design changes to type design as described above must be implemented in a supplier's internal procedure. This procedure *shall* also:

- Describe the flow down of such criteria and its implementation at the supplier's sub-tiers involved in design activities;
- Detail the approval criteria in agreement with paragraph [5.3.3.1](#);
- Specify the responsible signatories in the supplier's organisation;
- Describe how the information of changes is exchanged between the supplier and LH, according to the rules in paragraph [5.3.3.1](#);
- Include planning and execution of auditing activities to monitor the correct flow down of design changes criteria and approval criteria. This applies to both supplier's internal organisation and to its sub-tiers, where applicable.

5.3.3.4 *Management of Production Process Changes*

For changes affecting frozen production process, in particular special and critical processes, and the possible sources as well the manufacturing site for the end item, First Article Inspection shall be partially or totally repeated; production process shall be re-qualified. In this case, supplier *shall* resubmit to LHEO prefilled EN9102 forms (see §5.2.2.2), to highlight the introduced changes with respect to previous qualification. LHEO, involving LHPO, evaluates the introduced changes and, when needed, establishes additional verifications.

5.3.3.5 *Interim changes to programmed equipment*

This paragraph is applicable to suppliers responsible for the development of programmed equipment.

For such equipment, during the development phase after the qualification status of EFA, a fast management and traceability of changes can be required, in particular concerning SW changes. In these cases traceability will be ensured through the use of provisional P/N.

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The supplier having this necessity *shall*:

- Agree in advance with the **LH** Project Leader the use of this methodology;
- Ask to **LH** Project Leader, for each interim change that must be introduced and tested by **LH**, the number of provisional P/N (equivalent to the number of EO Development Test Trial). The identification of equipment, recording and traceability of changes on the applicable technical documentation *shall* be made as indicated in the relevant paragraphs.

5.3.3.6 Data Exchange

The change request to the requirements of the Technical Specification *shall* be managed using the SCN form.

The supplier *shall* prepare the SCN also in case of major change to the configuration of the deliverable equipment/part; independently from the event that has generated it.

The supplier *shall* prepare the internal "Change Form", by implementing the following rules:

- For Major Change; the supplier *shall* send the SCN, the "Change Form" and all the documentation to the **LH** Technical Area in charge. The change cannot be implemented until approved by **LH** D&D, by signature on the SCN.
- For Minor Changes (that involve the CS requirements), the supplier *shall* send the "Change Form". D&D reserves, within 30 days, to request a re-evaluation and reclassification of the change. In case of no request from **LH**, the supplier *may* proceed to the introduction of the amendment.
- For Minor Changes (clerical error etc...), the supplier *shall* send the COMO to the **LH** technical area. These changes are sent to **LH** for communication only, and the supplier can proceed with the introduction of the amendment after sending of COMO.

For all the Changes, the relevant documentation (including **LH** transmission and approval evidences) *shall* also be kept and formally recorded by **LH** for any check and evaluation.

5.3.4 Configuration Management

Unless waived by the contract, The process of control/configuration management *shall* be described in a "Configuration Management Plan" (CMP).

5.3.5 Identification and marking

5.3.5.1 Equipment/parts identification

All the parts or equipment deliverable (End Item) *shall* be identified according to the LHEO Technical Specification and/or SCD.

When a supplier which is the designer responsible in accordance with the Technical Specification, uses Sub-tier supplier, the following two cases can occur:

- The Sub-tier supplier produces the equipment/part using the detailed drawings of the main supplier; in this case the Main Supplier's P/N *shall* be marked on the equipment/part;

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- The Sub-tier supplier produces the equipment/part using own drawings (designer responsible of the part); in this case the equipment/part *shall* be identified with the Sub-tier supplier's P/N.

The parts/equipment *shall* be marked permanently and legibly with the following data:

- name, mark or symbol of the Manufacturer as identified by the applicable design data;
- P/N as defined by the Designer of the applicable design data;
- Modification status: it is the revision of the applicable detail drawing or Part List. The Modification status (or equivalent) shall be marked in a distinct manner from the P/N;
- S/N of the manufacturer or Batch Number if the serialization is not required;
- P/N of the Main Supplier in case that the Designer is different from the Main Supplier, shall be added also the Supplier P/N as responsible of compliance with the LH Technical Specification;
- LH P/N or program P/N as defined by LH Technical Specification;²
- Equipment/part description;
- Manufacturing date;
- The number of Concession/Production Permit (if any).

5.3.5.2 Equipment containing SW/AEH

For equipment containing any type of SW (Operations, Mission, Equipment, Application, etc.), the P/N *shall* include indications on the combination of HW and SW.

Any changes to SW *shall* have an impact on the P/N of the end item and *shall* be managed according to what described for the major changes (ref. § 5.3.3.3).

The code of the SW *shall* not be marked on the label.

SW modification management performed adding an additional label referred to SW configuration, without changing the End Item identification code (P/N), is strictly forbidden.

NOTE: The supplier that designs and developments software and/or complex Hardware *shall* refer to QRS-116 and QRS-117 also. In addition, the supplier *shall* promptly communicate to LH Focal Point the presence of SW and/or complex HW.

5.3.5.3 Sub components identification

Each subassembly *shall* be correctly identified in accordance with the principles of the above paragraphs; the identification *shall* include, as minimum:

² Not Required for "S" supplier typology

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- Manufacturer P/N;
- S/N or "Batch Number" assigned by "Manufacturer";
- Modification Status.

In case that a module/subassembly with embedded the SW, the module P/N *shall* take into account the SW Version and Release (ref. §5.3.5.2).

5.3.5.4 Special identification

In case of delivery of equipment/parts declared "NOT FOR FLIGHT" due to their configuration or non-conformities and the relevant limitation is not removable without physical alteration (through repairs, reworks or retrofit), the part shall be subjected to the following requirements:

- Shall be identified by means of a red band, 20 mm large compatibly with the item dimensions;
- CoC and Log Card (if required) shall clearly indicate "NOT FOR FLIGHT".

These requirements do not apply to components for which the "NOT FOR FLIGHT" limitation has been declared due to the fact that demonstrations of compliance of the design or manufacturing process have not yet been performed.

These items will change their compliance status in "FOR FLIGHT", and DDP will be revised, after the removing of the non-conformities or the performing of demonstrations.

In this case, the applicable DDP, referenced with its identification code (without revision) to CoC, will declare achievement of the new compliance status.

5.3.6 Critical Parts

5.3.6.1 Definition

Parts/equipment are classified into two categories on the basis of the consequences of a failure on the airworthiness of the UAV, according to CS UAS definition below:

Critical parts

(a) *Critical part - A critical part is a part, the failure of which could have a catastrophic effect upon the UAV, and for which critical characteristics have been identified which must be controlled to ensure the required level of integrity.*

(b) *If the type design includes critical parts, a critical parts list shall be established. Procedures shall be established to define the critical design characteristics, identify processes that affect those characteristics, and identify the design change and process change controls necessary for showing compliance with the quality assurance requirements of Part-21.*

- Critical part: is the part where a single failure results are catastrophic in the terms stated by CS-UAS.
- Non-critical part: is the part the failure of which does not cause a catastrophic event.

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Military - A “catastrophic failure condition” is a failure condition that is expected to result in at least uncontrolled flight (including flight outside of pre-planned or contingency flight profiles/areas) and/or uncontrolled crash. Failure conditions which may result in a fatality to UAV crew or ground staff.

Civil - Failure conditions that are expected to result in one or more fatalities.

5.3.6.2 Part/System/Equipment classified (critical/non critical) by LH Technical Specification

In this case, the LH Technical Specification, on the basis of the safety analysis performed and the relevant functionality of the whole aircraft, defines the classification of the part (critical/non critical). The supplier *shall* classify and manage the parts accordingly.

5.3.6.3 Management of Critical Parts

Considering the principles and requirements detailed in §5.3.6.1 the Supplier *shall*:

- Report on the drawings of critical part, system or equipment the legend "CRITICAL PART" or equivalent;
- Identify, on manufacturing drawings and/or 3D models of critical parts/system/equipment, the critical characteristics. The critical characteristics *shall* be identified with a "c" inside a diamond unless otherwise specified;
- Ensure the production traceability through the serialization of the part.

The supplier must be able to associate the S/N of the internal components classified as critical with the S/N of the higher level part/equipment and *shall*:

- maintain a critical components list of critical part, system or equipment;
- manage changes to the production process, including as described below.
Any changes to the production process included in the list below *shall* be approved by LH D&D before its implementation and with the execution of a new TAC, in case of new tests are deemed necessary, before changes introduction (ref. § 5.3.7):
 - modification of: plant, raw material, critical operation, special process, numerical control program, special tools, particular part of a tool (for tools for forming foundry, for example, a change of the scheme of casting and feeding);
 - Change or new lay-out of the production site.

Remark: these requirements are applicable also for the internal components classified as “CRITICAL”.

5.3.7 Test Article Conformity (TAC)

5.3.7.1 General

For any part, system or equipment used for demonstration of compliance testing, the supplier *shall* produce a "Certificate of Conformity" to the Applicable Design Data.

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For each significant P/N to qualify, evidences necessary to issue the statement *shall* be collected in a report called TAC.

The TAC, like the First Article Inspection for the First Production Run phase, *shall* be performed in accordance with EN9102 requirements. The TAC report *shall* be approved by the **LH Engineering Chief Project**.

For each of the items that will be used for the tests there *shall* be evidence that:

- The items are in compliance with applicable technical data;
- Any non-compliance with applicable technical data are irrelevant to the effects of test results.

In any case, FAI could be performed instead of TAC for qualification testing of prototype and/or pre-series parts.

5.3.8 Conformity to the applicable technical data

For the manufacturing of prototypical parts and/or pre-series for qualification testing, the supplier *shall* establish a process to ensure compliance with the applicable design data.

In addition, a Test Article Conformity (TAC) shall be performed including as a minimum:

- A complete dimensional check with record of the results detected;
- Execution of ATP and its recording (ATR), if applicable;
- Further verification of compliance with applicable requirements of the detailed design;
- Evidence of successful implementation of manufacturing procedures and inspection;
- Any destructive tests on a sample;
- Evidence of qualification of special processes;
- Any other verification necessary to demonstrate that the manufacturing process is suitable to produce parts in compliance with the applicable technical data.

The Supplier can define additional inspections to be performed to ensure the demonstration of compliance.

All the evidence *shall* be collected in a TAC report, with the addition of the following data:

- The equipment/part drawing assembly together with all the subpart drawings assembly required for evaluation by LHEO completeness checks;
- Part List of the equipment/part;
- Copies of the control specifications of any critical characteristics and/or evidence that those specifications are equivalent to those normally used by **LH** for identical processes.

The TAC report *shall* be sent to LHEO for approval with relevant Form.

If the TAC is not approved, the parts cannot be delivered to **LH** laboratories or used for testing in the supplier's laboratories.

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The TAC activities *shall* be performed and/or repeated in the following cases:

- At the first test of demonstration of compliance for that P/N, regardless of the site or laboratory where the test will be performed;
- If there are any significant changes in the manufacturing process (impacting the performances) of the prototypical units, this case will be managed by a revision of the existing TAC;
- In case of changes to equipment configuration, with change of P/N: in this case, the TAC will be reissued with new numbers.

5.3.9 Test article representativeness and Test Authorization Form

When a TAC is approved, the equipment/parts manufactured with the same process *may* be used for test.

The supplier *shall* perform the following actions:

- The equipment/part for testing *shall* be accompanied by a Certificate of conformity, issued on the basis of the result of the TAC applicable and further verification (ATP, dimensional check, etc.)
- Any non-conformity *shall* be managed as described in §5.3.10. The non-conformities *shall* be approved by the relevant LH D&D to authorize the execution of the test if the non-conformity is irrelevant to the effects of the test.

Once carried out the above described actions, two cases can occur:

- For tests that will be performed at the supplier sites (or its Sub-tier suppliers), the supplier *shall* prepare the "Test Execution Authorization" form (Ref. Annex A), with the evidences described above
- For tests that will be performed at other sites, the supplier *shall* send to LHEO the evidence of compliance of the part delivered.

5.3.10 Non conformity management

For the test item, the supplier *shall* give evidence of any non-conformity to the applicable technical data, reporting the relevant reference in the "Certificate of Conformity".

The findings *shall* be managed according to the supplier procedures, recognized by LH.

Except in cases where the supplier decides to scrap the part, the supplier *shall*:

- Fill the "Concession" form QRS-107_F01 (see QRS-107) and submit to LHEO D&D for evaluation and approval;
- Ensure that the non-conformity report includes:
 - Traceability;
 - identification of the root cause;
 - evidence of management of any corrective actions taken.

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- Report on the "Certificate of Conformity" reference to all the non-conformities and the applicable repair drawings, attaching a copy of the documentation;
- Mark on the equipment/part the concession number if requested by LHEO decision;
- In case of approval by LHEO, and after the application of corrective actions, the supplier *will*:
 - deliver the part, or
 - test the part, if this activity is performed by the Supplier

5.3.11 TAC for equipment with provisional P/N

When a change is introduced to programmed equipment managed with a provisional P/N, a sheet *shall* be added to the TAC already issued and approved in the EFA phase.

This sheet *shall* report the description of the changes from the previous configuration and *shall* be approved by the supplier's Design Organization responsible.

5.3.12 Design Data Set (DDS)

The Supplier *shall* issue the document which defines the DDS at the Critical Design Review and keep it updated during design evolution for each major modification to the configuration and for modifications to documents referred by the configuration itself.

The Design Data Set has to be approved by LHEO before Supplier Engineering release to its PO.

The data *shall* be transferred, from Supplier Engineering to LHEO and vice versa, as agreed in the Quality Plan.

For the DDS issue and subsequent variations a COMO (see Annex B) *shall* be issued.

5.3.12.1 DDS contents

The following indications refer to the Form in Annex E.

The front page of the document must report, as a title, a description of the assembly or the part of the Technical Specification or Source Control Drawing issued by **LH**.

The heading of tables composing the document has to report reference to **LH** and Supplier P/Ns, with the relative revisions.

5.3.12.2 DDS approval

Supplier Configuration Control approval states that the drawings tree reported in the document is the one formally issued and managed in accordance with the procedure of Change Management.

Supplier Chief Designer approval states that the reported configuration is the applicable one; it is up-to-date and suitable for the issue of product documentation.

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LH Chief Designer accepts what stated by Supplier Chief Designer and assures the correspondence between Supplier and LH P/Ns.

LH CPE, with his signature, freezes the applicable technical data package which has to be used by the PO for the issue of product documentation.

At the end of the approval process, LH returns the document to the Supplier.

5.3.12.3 DDS filing

The Supplier is responsible of filing the document which states DDS approval by LH and of presenting it if required by LH or Civil or Military Authorities.

5.4 Access and data visibility

5.4.1 Access to the sites

The supplier *shall* guarantee the access to all design, qualification and manufacturing sites used for activities concerning the program and contract, to all LH and to the Authority representatives through LH, according with the purpose and time scale defined in the program/contract.

5.4.2 Documentation

In addition to the documentation required in this document, which *shall* be provided to LHEO by contract, the supplier *shall* provide, on the request of LHEO or of the competent Authorities, copies of all documents deemed necessary to complete the certification process.

The supplier *may* refuse the resolution of a requested document if the same is considered confidential or exclusive property for industrial reasons. In this case the supplier *shall* allow the consultation and auditing of such documents at any time with modalities to be defined Case by case.

LHEO, the Authorities (Civil or Military) or LH customers (always through LH organization), *may* require the supplier to produce a document equivalent to that considered "confidential", removing confidential information, if the availability of such document is necessary for closure of the certification process and/or acceptance by LHEO the customer.