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Quality requirements for the supply of Special Processes

SUMMARY:

This document describes the specific quality requirements for the supply of Special Processes to the Defence Systems Division of Leonardo S.p.A.

The general quality requirements for supplies to Leonardo-SDI are defined in the PQA004-L procedure.

	Responsibility/Unit	Name/Signature
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For conformance to original Italian edition

Date: 2019/05/06

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AMENDMENT RECORD

Rev.	Date	BMSCP	Description	Authors
00	15/03/2018	-	First issue	N. Rosina, C. Pagni, A. Decima
01	22/10/2018	055	Whole document: updated ref. to UNI EN 9100:2018; Para. 2.1: removed notes for applicability of AQAP-2110, EN-9100, ISO-9001; Para. 5.2.2: specified the applicable paragraphs for validation of Welding processes (IC 15 and IC 18); - specified the applicable activities for validation of Bonding/Gluing processes (IC 19) and Impregnation and Resin Treatment processes (IC 20)	C. Pagni

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1 INTRODUCTION

1.1 Purpose

This document defines the requirements that a supplier to the Defence Systems Division of Leonardo S.p.A. (hereinafter referred to as Leonardo-SDI) shall comply with in the event that a Special Process as listed in paragraph 1.2 shall be applied to the supply; it describes the approval and re-approval process for the supplier of special processes and lists the controls and certificates to be produced for the supply of special processes.

More general quality requirements applicable to all supplies are defined in the PQA004-L procedure.

1.2 Applicability

This document applies to all Type D supplies[1] that are to be incorporated into the products and/or services for Leonardo-SDI's customers. It shall also apply whenever a supplier has to perform a special process as part of Type A, C, E, F or G supplies.

The special processes to which this document applies are:

- External Special Processes as defined by Leonardo-SDI standards or national and international reference standards (e.g. MIL, ASTM, etc.).
- Non-Destructive Tests on special processes defined by procedures belonging to Leonardo - Leonardo-SDI or by national and international reference standards (e.g. MIL, AMS, ASTM, etc.).

Leonardo-SDI considers the following to be special processes:

a. welding and braze-welding (this also includes resistance spot welding, not-welded mechanical connections with rivets, crimping, etc.);
b. heat treatments;
c. bonding (gluing);
d. painting;
e. surface treatments;
f. wiring of electrical equipment (this also includes not-welded electrical connections using crimping);
g. manual and wave soldering of printed circuit boards; surface assembly soldering;
h. forming of composite materials;
i. Non-Destructive Tests (NDT).

[1] See definition of types in document PQA004-L.

1.3 Type and Classification Index of the supply

As provided for in document PQA004-L, each supply is characterised not only by Type but also by a Classification Index (CI), which identifies the characteristics of the supply and consequently the activities and documents required of the supplier.

*For example, code **D5** indicates a Passivation process (Type D, Index 5).*

The following are the values and meanings of the Classification Index for Type G supplies. The related activities and documents required from the supplier are described in paragraph 5.2.2.

CI	Special Process
1	PHOSPHATING
2	CHROMIC ANODIZING
3	SULPHURIC ANODIZING
4	ALUMINIUM CONVERSION
5	PASSIVATION
6	ELECTROLYTIC CHROME PLATING
7	ZINC-NICKEL
8	CHEMICAL NICKEL PLATING
9	HARD ANODISING
10	SILVERING

CI	Special Process
11	PAINTING
12	MASSIVE HEAT TREATMENTS
13	LOCALIZED HARDENING BY HEAT INPUT
14	STEEL SURFACE ENRICHMENT
15	WELDING
16	PROCESS ON COMPOSITE MATERIALS
17	VT-PT-MT-UT-RT NON-DESTRUCTIVE TESTING
18	ELECTRIC WELDING
19	BONDING (GLUING)
20	IMPREGNATION AND RESIN TREATMENT

Table 1 – Classification Index for Type D Supplies

For each supply, the Type and Classification Index are indicated in the Purchase Order.

2 REFERENCES[2]

2.1 Documents

Code	Title
Contractual (applicable when required by the PO or the Contract)	
AQAP 2110 Ed D	NATO Quality Assurance Requirements for Design, Development and Production
UNI EN 9100:2018	Quality Management Systems-Requirements for Aviation, Space and Defense Organizations.
ISO 9001:2015	Quality Management System – Requirements.
UNI EN ISO 3834	Quality requirements for fusion welding of metallic materials
UNI EN ISO 9712	Non-destructive testing - Qualification and certification of non-destructive test personnel
Internal Reference Documentation	
PQA004-L	Quality requirements for supplies to the Leonardo-SDI Division
QUA017-T	List of approved suppliers of Special Processes/NDT and their sub-tier supply chain
OTO-RS-1	Manganese or zinc-based phosphating process
OTO-RS-2	Anodizing of aluminium and its alloys (chromic acid process)
OTO-RS-3	Anodizing of aluminium and its alloys (sulphuric acid process)
OTO-RS-4	Passivation process for aluminium and its alloys
OTO-RS-6	Passivation of stainless steels
OTO-RS-8	Electrolytic chrome plating
OTO-RS-10	Electrolytic zinc-nickel coating
OTO-RS-12	Chemical nickel plating process
OTO-RS-13	Control Procedure for Special Processes
SN5260001	Hard Sulphuric Anodizing
OTO-RS-19	Silvering surface treatment
OTO-VE-0	Painting processes for Leonardo-SDI products
OTO-TT-1	Heat treatment of ferrous materials
OTO-TT-2	Heat treatments for surface hardening of ferrous alloys

[2] For standards or publications cited without a revision date or index, the most recent version available shall be considered the reference.

3 DEFINITIONS AND ACRONYMS

3.1 Definitions

Definition	Description
Special Process	Production process or service delivery, the result of which cannot be verified by subsequent non-destructive monitoring or measuring activities, with the consequence that any shortcomings can only become evident when the product is already in use or the service has been delivered. The special process shall therefore be ensured by means of specific periodic checks which include staff training, verification of the suitability of the installations for the relevant qualification, staff and consumables used.
Assessment	The qualification shall be applied to all factors in the process as defined by the qualification specification. When required, the qualification of new personnel assigned to a special process does not necessarily mean the qualification of the process has to be repeated.
Validation	Verification of conformity of a special process with the applicable technical specifications, based on documented evidence.
Approval	If the verification checks carried out are successful, the result of the evaluation is the confirmation that the process is qualified and is therefore approved for use. Approval is given with the issue of a formal process qualification certificate, called the "Process Qualification Declaration". The qualification certificate may be issued with operational limitations on its use (e.g. the use of the process for certain parts or assemblies).

In addition, the definitions of document PQA004-L shall apply.

3.2 Acronyms

Acronym	Description
BMSCP	Change Proposal for BMS document
CI	Classification Index
DDT	Transport document
DQP	Process Qualification Statement
GQAR	Government Quality Assurance Representative
MCP	Manufacturing and Control Plan (Piano di Fabbricazione e Controllo (PFC))
NADCAP	National Aerospace and Defense Contractors Accreditation Program
NC	Nonconformity
NDT	Non Destructive Tests
PN	Part Number
PO	Purchase Order
QMS	Quality Management System
WPQR	Welding Procedure Qualification Record
WPS	Welding Procedure Specification

4 GENERAL REQUIREMENTS

The following requirements, as set out in PQA004-L, shall apply to all supplies covered by this document:

- General requirements for Supplier's Quality System;
- Documentation;
- Determining and reviewing requirements;
- Identification and traceability;
- Acceptance of the supply;
- Control of nonconforming products;
- Product preservation;
- Right of access and support for the customer and GQAR

5 SPECIFIC REQUIREMENTS

5.1 General

For the supply of special processes Leonardo-SDI requires:

- **Process Qualification/Certification;**
- **The Process Specification.**

In addition, when a special process is referenced in the applicable technical documentation, the following requirements shall be met:

a) The Supplier shall identify the special process by indicating it on the MCP[6];
b) The Supplier shall identify all of the characteristics of the process in order to ensure its repeatability under controlled conditions (WPS for welding processes and operating cycle with the technical parameters indicated for the other processes);
c) The Supplier shall indicate the types of controls to be carried out at the end of the process, making reference to the applicable specifications and including them in the MCP;
d) Special Processes, including those performed by any sub-tiers, shall be validated before they are carried out on products supplied to Leonardo-SDI by means of appropriate controls and subsequent approval of the MCP;
e) Special Processes shall be periodically reviewed (the frequency is indicated in the DQP);
f) If a Supplier has the Design Authority of a supply, formal approval by Leonardo-SDI is not required but the Supplier may use its own special processes provided that it demonstrates the control of the sub-tier supply chain and the periodic validation and revalidation of the special processes.

5.1.1 Process Qualification/Certification

Qualification or certification of the process (by a recognised third party or a company whose quality standards are known, appropriate and accepted by Leonardo-SDI) means all the activities that are necessary to demonstrate that a manufacturing process is capable of meeting the requirements specified in clearly identified international standards (such as, for example, the following: UNI EN; ISO; DIN; SAE AMS; ASTM, etc.).

Qualification can also be conducted by Leonardo-SDI or agencies designated by it.

The Supplier shall transmit the qualification and/or certification documentation to Leonardo-SDI before the start of the activity.

Any changes to the special process (e.g. changes in certified personnel, infrastructure or sub-tiers) shall be promptly and formally communicated to Leonardo-SDI.

5.1.2 Process Specification

The Process Specification is a document that demonstrates that the supplier's organization has adopted the international standard or, if the process is proprietary, the internal reference standard, showing the operating parameters, technical requirements and the methodology used to keep the process under control, in order to satisfy the product quality requirements. This document, which shall first be approved by Leonardo-SDI, shall be available at the Supplier's workstations.

Unless otherwise specified in the drawing and/or order, the international standards referred to in the Leonardo-SDI special process specifications shall be applied.
If the company intends to operate using its own specifications which have different reference standards, these shall be submitted to Leonardo-SDI for approval within 30 calendar days of receipt of the Order and in any case before starting the activities.

[6] Alias Piano di Fabbricazione e Controllo (PFC)

5.2 Approval of Special Processes

5.2.1 Initial qualification

The initial qualification of the special process involves a series of verifications, carried out in order to collect the documentary evidence necessary to confirm the conformity of the process to the applicable technical specifications.

The verifications should be applied to all elements of the special process, in accordance with the criteria and methodologies defined in the applicable technical specifications.

The verifications are carried out by Leonardo-SDI using the following procedure:

	Activity	Method of formalising the activity	Step
1	Verification of documentation submitted by the supplier for preliminary assessment and consultation of documentation in the public domain.	None	UNDER EXAMINATION
2	Verification of the conformity of the special process (documentary or audit). In general this includes: i. Verification of the criteria defined for the review and approval of the process. ii. Verification of the requirements defined for the records. iii. Verification of the efficiency of the system/equipment. iv. Verification of compliance with mandatory requirements, with particular reference to safety and the environment. v. Verification of materials and tools used. vi. Verification of the qualifications of the personnel involved. viii. Verification of the technical documentation related to the process (applicable technical specifications, methods of implementation, etc.). ix. Checking the schedule and frequency of periodic maintenance and renewal of validity checks. vii. Performance, if planned, of specific controls on the product, for example by means of reference samples (validation, see Table 3). The activities require the collection of the necessary documentation (e.g. calibration certificates, plant layouts, personnel certifications, qualified WPS, etc.).	Checklist Audit plan Audit report Technical dossier Laboratory certificates (if any)	UNDER ASSESSMENT
3	Confirmation of qualification of the process	DQP	APPROVAL

Table 2 - Approval of the special process

The status of the supplier, depending on the progress of the activities, will go through the following steps:

a) UNDER EXAMINATION: Leonardo-SDI has started the review of the documentation submitted by the supplier.

b) UNDER ASSESSMENT: Leonardo-SDI has started the necessary verification activities of the supplier process.

c) APPROVED: Leonardo-SDI has approved the supplier's qualification by issuing the required certificate.

Leonardo-SDI reserves the right to approve, without additional verification, the process of a supplier already in possession of certifications issued by an Approved Third Party.

If the Special Process Supplier has certification from an Approved Third Party and the Leonardo-SDI technical documentation shows a different special process from the one indicated in the scope of this certification, an additional verification on the process will be performed.

The supplier shall promptly notify any loss of the certifications declared to Leonardo-SDI.

5.2.2 Validation of the Special Process and Operational Management

The reference standard applicable to each special process is indicated in the applicable technical documentation and/or the PO and/or the Supply Specification and it shall be applied in full.

The table below shows the activities to be carried out during the verification/validation phase of the special process with the relative test pieces to be produced and the checks to be carried out (see the *Validation/Revalidation Tests* column) and the minimum documentation that the special process supplier shall deliver to complete the activity which it performs (see the *Tasks to be performed for each production batch* column).

The following table is not exhaustive; further processes may be included based on the evaluation of Leonardo-SDI.

Leonardo-SDI reserves the right not to carry out practical tests if there is sufficient documentation attesting to the quality of the processes carried out, such as certificates of analysis from accredited laboratories or qualifications from other companies.

The check on the treated test pieces shall be carried out by accredited Laboratories. However, Leonardo-SDI reserves the right to carry out the analyses at its own Technical Laboratory.

CI	**Special Process and Reference Procedure**	**Tests to be carried out in the Validation/Revalidation phase**	**Tasks to be performed for each production batch**
1	PHOSPHATING (Manganese or Zinc based) OTO-RS-1	Production of 24 steel panels for: **a) determination of phosphate weight - 4 test pieces 50 x 50 x 2 mm (2 for Mn, 2 for Zn)** **b) for salt spray test (5 x Zn unoiled, 5 x Zn oiled, 5 x Mn unoiled, 5 x Mn oiled)**	The test report for each batch shall contain: **a) Visual inspection;** **b) Verification of thickness of phosphate layer;** **c) Time/temperature diagram of dehydrogenation (if applicable).**

Cl	Special Process and Reference Procedure	Tests to be carried out in the Validation/Revalidation phase	Tasks to be performed for each production batch
2	OXIDATION CHROME ANODIZING (Aluminium and alloys) OTO-RS-2	Production of 8 test pieces in alloy 2024 or 5083 with dimensions of approximately 250 x 80 x 1 mm for: **a) 5 for salt spray (fog) test** **b) 2 for determination of coating weight** **c) 1 for determining the coating thickness**	The test report for each batch shall contain: **a) Visual inspection;** **b) Verification of thickness of anode layer;**
3	OXIDATION SULPHURIC ANODIZING (Aluminium and alloys) OTO-RS-3 SN5260001 §4.1	Production of 8 test pieces in alloy 2024 or 5083 with dimensions of approximately 250 x 80 x 1 mm for: **a) 5 for salt spray (fog) test** **b) 2 for determination of coating weight** **c) 1 for determination of coating thickness**	The test report for each batch shall contain: **a) Visual inspection** **b) Verification of thickness of anode layer** **c) Certificate of Conformity**
4	ALUMINIUM CONVERSION OTO-RS-4	Production of 15 test pieces in alloy 2024 or 5083 with dimensions of approximately 250 x 80 x 1 mm for: **a) 5 for saline mist,** **b) 5 for paintability test,** **c) 2 for determination of coating weight** **d) 2 for presence of dust** **e) 1 for successful conversion**	The test report for each batch shall contain: **a) Visual inspection;** **b) Performance of the spraying test with related result/successful conversion test on sample plate**
5	PASSIVATION (STAINLESS STEEL) OTO-RS-6	Production of 9 stainless steel test pieces of about 250 x 80 x 1 for: **a) 5 for salt spray (fog) test** **b) 2 for passivity test** **c) 2 for determination of resistance to liquids**	The test report for each batch shall contain: **a) Certificate of successful passivation.**
6	ELECTROLYTIC CHROME PLATING OTO-RS-8	Production of 6 steel test pieces for: **a) 2 for determining the coating thickness** **b) 2 for determining hardness** **c) 2 for porosity tests** **d) 2 test pieces 125 x 2.5 x 1 mm to determine adhesion** .	The test report for each batch shall contain: **a) Visual inspection;** **b) Verification of the thickness of the coating (mini-test or with dimensions);** **c) Dehydrogenation diagram when required.**
7	ZINC-NICKEL OTO-RS-10	Production of 9 steel test pieces for: **a) 5 test pieces or panels 250 x 80 x 1 mm for determination of corrosion resistance** **b) 2 test pieces or panels 250 x 80 x 1 mm for determination of alloy and thickness** **c) 2 test pieces 120 x 2.5 x 1 mm for determination of adhesion**	The test report for each batch shall contain: **a) Visual inspection** **b) Verification of thickness of the coating and alloy** **c) Dehydrogenation diagram when required.**

Cl	Special Process and Reference Procedure	Tests to be carried out in the Validation/Revalidation phase	Tasks to be performed for each production batch
8	CHEMICAL NICKEL PLATING OTO-RS-12	Production of 9 steel test pieces with 50 µm coating for: **a) 5 test pieces or panels 250 x 80 x 1 mm for determination of corrosion resistance** **b) 1 test piece or panel 250 x 80 x 1 mm for determination of thickness** **c) 1 test piece or panel 250 x 80 x 1 mm for determination of alloy (maximum coating thickness 20 µm)** **d) 2 test pieces 125 x 2.5 x 1 mm for determination of adhesion**	The test report for each batch shall contain: **a) Visual inspection;** **b) Verification of the thickness of the coating on the sample plate with dimensions on the item;** **c) Dehydrogenation diagram when required.**
9	OXIDATION HARD ANODIZING (Aluminium and alloys) OTO-RS-13 SN5260001 §4.2	Production of 10 test pieces in alloy 2024 or 5083 with dimensions of approximately 250 x 80 x 1 mm for: **a) 5 for salt spray (fog) test** **b) 2 test pieces for weight determination** **c) 1 test piece for thickness and micrographic hardness** **d) 2 test pieces to be submitted to the Taber test**	The test report for each batch shall contain: **a) Visual inspection** **b) Verification of thickness of anode layer (with mini test)** **c) Certificate of Conformity**
10	SILVERING OTO-RS-19	Production of 12 steel test pieces for: **a) 2 for determining the coating thickness** **b) 2 for determining adhesion** **c) 2 for determining hardness when required** **d) 2 determination of oxidation resistance when required (GRADE A)** **e) 2 Weldability when required**	The test report for each batch shall contain: **a) Visual inspection** **b) Verification of thickness (X-rays);** **c) Verification of roughness;** **d) Stress relief and dehydrogenation diagram (when necessary).**
11	PAINTING OTO-VE-0	Production of 10 Q-Panels identified as follows: **a) 5 x QS46l (Treated steel)** **b) 5 x QAL46 (Treated Aluminium) used to determine thickness of total primer package, brilliance and adhesion**	The test report for each batch shall contain: **a) thickness check;** **b) gloss verification;** **c) performance of adhesion tests on Q-panel with associated results;** **d) verification of colour point.**

CI	Special Process and Reference Procedure	Tests to be carried out in the Validation/Revalidation phase	Tasks to be performed for each production batch
12	MASSIVE HEAT TREATMENTS OTO-TT-01	Provisional DQP issued and, when an order is received, in case of approval of hardening processes, treatment of a sample together with the batch for verification: **a) No cracks** **b) Hardness curve** **c) Mechanical tests**	The test report for each batch shall contain: **a) Time/temperature diagram;** **b) Hardness test (if required)** For HARDENING and TEMPERING: **c) Time/Temperature Diagram;** **d) surface hardness;** **e) Where required mechanical tests and metallographic analysis.**
13	LOCALIZED HARDENING BY HEAT INPUT (Induction, laser, flame hardening) OTO-TT-02	**N.B. Qualifications are issued for the PN tested.** If a new PN is treated, the process shall first be tested on a mock-up with significantly comparable geometry and material. The following shall be verified: **a) Integrity certificate assessed with NDT (MT/PT)** **b) Surface hardness** **c) Hardening depth (hardness curve)** **d) Nital etching (photograph of the hardened section(s))**	The test report for each batch shall contain: **a) Integrity certificate assessed with NDT (MT/PT)** **b) Surface hardness** **c) Certification of correspondence to cycle performed at the qualification stage**
14	STEEL SURFACE ENRICHMENT (nitriding - cementation) OTO-TT-02	Provisional DQP issued and, when an order is received, treatment of a test piece of the same alloy and of a comparable shape to verify: **a) Surface hardness** **b) Hardening depth** **c) No cracks**	The test report for each batch shall contain: **a) Time/Load Temperature/batch diagram;** **b) Hardness curve carried out on test piece; part of the test piece to be sent to Leonardo-SDI;** **c) When required, metallographic analysis.** **d) Integrity certificate assessed with NDT (MT/PT)**

Cl	Special Process and Reference Procedure	Tests to be carried out in the Validation/Revalidation phase	Tasks to be performed for each production batch
15	WELDING ISO 3834 This also includes welding for resistance spots, mechanical connections not welded with rivets, crimping. .	Document verification, according to the requirements of par. 5.3.1	Preliminary activities at the start of production: **a) MCP approval and simultaneous verification of applicability of qualified WPS (WPQR) referred to therein** **b) Verification of qualifications of welders and NDT operators.** Tasks to be performed for each production batch: **c) MCP application** **d) Completed MCP and related records/evidence;** **e) Records of non-destructive tests.**
16	PROCESSES ON COMPOSITE MATERIALS	DQP provisionally issued and, when an order is received, on test piece samples: **a) Mechanical tests** **b) Layering**	The test report for each batch shall contain: **a) Raw materials certificates;** **b) Mechanical testing (if required by drawing/specification)** **c) Layering (if required by drawing / specification)** **d) Environmental tests (if required by drawing/specification).**
17	NON-DESTRUCTIVE TESTS VT-PT-MT-UT-RT	Where required, evidence of systems kept under control and in a valid condition. Evidence of the valid qualification status of the certifying staff issued by a recognised organization. Execution of controls on the test piece provided by Leonardo-SDI (if required)	Test report as required by applicable standards and countersigned by level II personnel.
18	ELECTRIC WELDING Including not welded electrical connections	Document verification according to the requirements of par. 5.3.2 and 5.3.3	Preliminary activities at the start of production: **a) MCP and process approval** **b) Verification of the certification of plant/welders and of the operators involved.** Tasks to be performed for each production batch: **c) MCP application** **d) Completed MCP and related records/evidence;** **e) Records of non-destructive testing**

Cl	Special Process and Reference Procedure	Tests to be carried out in the Validation/Revalidation phase	Tasks to be performed for each production batch
19	BONDING (GLUING)	- Verification of the Process Specification; - Verification of the applicable test procedures; - Execution of test samples (quantity and characteristics depending from the supply requirements)	Preliminary activities at the start of production: **a) MCP and process approval** **b) Verification of certification of personnel involved in the construction of glued joints/plant.** Tasks to be performed for each production batch: **c) MCP application** **d) Completed MCP and related records/evidence;** **e) Records of non-destructive testing**
20	IMPREGNATION AND RESIN TREATMENT	- Verification of the Process Specification; - Verification of the applicable test procedures; - Execution of test samples (quantity and characteristics depending from the supply requirements)	Preliminary activities at the start of production: **a) MCP and process approval** **b) Verification of certification of the personnel involved.** Tasks to be performed for each production batch: **c) MCP application** **d) Completed MCP and related records/evidence;** **e) Records of non-destructive testing**

Table 3 - Validation Tests and Supply Requirements

5.2.3 Issue of the Process Qualification Statement (DQP)

If the activities described in Tables 2 and 3 are successfully carried out, the supplier of the special process is approved and registered in document QUA017-T. The DQP can be published on the premises of the production site and shall be available at the supplier's workstations.

The DQP contains:

- the type of process and any limitations;
- the types of controls to be performed on the process/product;
- international reference standards or those issued by Leonardo-SDI , the expiry date and the terms of its periodic revalidation.

5.2.4 Maintaining the qualification

In order to verify the continuing quality of the special process, the periodic checks required by the applicable process specifications shall be carried out and documented.

Periodic inspections shall be of the same type and frequency as those laid down at the time of qualification.

In addition to records of the qualification results, appropriate records of the quality controls of the carried out on the production items shall be kept for each special qualified process, as required. Such records shall be available and maintained for the specified period of time.

Leonardo-SDI shall be informed of any changes made to the process.

If an NC is found, the supplier shall implement effective corrective actions, giving evidence of them to Leonardo-SDI.

In the event of changes to one or more characteristic factors of the process, a partial requalification of the same shall be carried out, for the modified elements only. The pre-established qualification limits will remain valid for the whole process.

Any process changes introduced without notifying Leonardo-SDI will result in the immediate revocation of the DQP.

5.2.5 Qualification of the renewal

The supplier shall provide evidence that it has carried out periodic inspections according to a pre-established plan.

The approval of the special process lasts 2 years unless exceptions are made in the DQP and the process is not changed.

Below is the activity flow for renewal:

	Activity	Method of formalising the activity	Step
1	At the expiration of the deadline specified on the DQP, Leonardo-SDI shall contact the supplier to request its willingness to maintain the approval.	None	UNDER REVIEW
2	Collection of documentation and information to assess whether a quality system audit should be carried out (vendor ratings, nonconformities, delivery delays, etc.).	Check list - Audit plan - Audit report Updating of technical dossier Laboratory certificates (if any)	REASSESSMENT
3	Declaration of approval of the process	DQP	REAPPROVAL

Table 4 - Renewal of the Approval

If the supplier has a valid NADCAP certificate (or a certificate from another recognised body), accepted by Leonardo-SDI, it shall send the updated certificate.

5.2.6 Waivers/Concessions

Any waiver/concession from the provisions of the DQP shall be submitted to Leonardo-SDI in advance for approval.

5.2.7 Revocation or Suspension of the DQP

The qualification will be automatically revoked in the following cases:

a) If the qualification is not renewed by the time limits specified.

b) If the process is suspended for longer periods of time than those defined in the process specifications.

c) Due to plant relocation, replacement of equipment, major maintenance work, change of process materials.

d) Due to variations in the applicable specifications when these prescribe more restrictive requirements.

e) Due to a decline in the quality level of the process performance.

The qualification will be suspended in the following cases:

- Product NCs are detected which are attributable to the special process;
- Major/critical NCs are detected during the requalification process or maintenance checks.

5.2.8 Requirements for Personnel

The DQP shall contain the qualifications of all staff involved in the special process.

The supplier shall maintain a list of its qualified personnel with certified qualifications and their expiry date and shall provide evidence of this to Leonardo-SDI.

Special Process Personnel

In terms of validation, the supplier shall give evidence of:

- Certifications issued by recognised organizations;
- Any theoretical and practical training given to the personnel involved in each special process;
- Continuity of operational personnel.

Personnel Carrying Out Non-Destructive Tests

The supplier shall provide evidence of the qualifications and mandatory certifications of the NDT personnel issued by recognised organizations, which may be attached to the DQP.

5.3 Detailed requirements for welding

5.3.1 Requirements for mechanical welding

In general, unless otherwise specified in the contract, the activities of the welding manufacturing process shall be managed in accordance with the quality requirements of the family of standards UNI EN ISO 3834 (3834-2; 3834-3; 3834-4) and UNI EN ISO 3834-5 as a reference for the applicable product standards.

5.3.1.1 Requirements for control activities

Welds shall be free of imperfections that are not permitted, as these may impair their use. Acceptance levels shall comply with the applicable regulations. After welding, it is necessary to verify conformity with the appropriate acceptability criteria, unless otherwise defined by the drawing or order:

- By visual inspection according to UNI EN ISO 17637 (imperfections assessment according to UNI EN ISO 5817 - "Medium-C" class for steel arc welded joints; imperfections assessment according to: UNI EN ISO 10042 - "Medium-C" class for joints in aluminium and its alloys (arc welded);
- Through non-destructive examinations in compliance with the appropriate UNI EN standards for the type of control;
- Geometric dimensional inspection of the weld in compliance with technical documentation and UNI EN ISO 2553.

The evidence of control activities shall be recorded on the forms provided, which shall include the names of the qualified personnel. The personnel in charge of non-destructive inspection activities shall possess the appropriate certification for the type of inspection in accordance with UNI EN ISO 9712.

The status of post-welding inspections and controls shall be documented and recorded.

5.3.2 Requirements for soldering of electronic components (soft soldering)

In order to obtain the required approval, prior to the start of standard production, the Supplier shall send Leonardo-SDI documentation regarding the implementation of the planned operating procedure (manual welding, wave welding, surface mounted welding).

This procedure shall contain, among other things, the following information as a minimum:

a) the type of alloy and flux used;

b) the methods and timescales for cleaning the welds;

c) the printed circuit board washing/painting procedures, where applicable;

d) type of solvent and varnish, where applicable (for the operations in the previous section).

The above shall comply with the provisions of the applicable technical documentation. Furthermore, in the case of welds of components sensitive to electrostatic discharges, the Supplier shall have suitable workstations for this type of activity, which comply with the provisions of the applicable technical documentation.

5.3.3 Requirements for seamless electrical connections

In order to obtain the required approval, prior to the start of standard production, the Supplier shall send Leonardo-SDI documentation regarding the implementation of the planned operating procedure; this document shall be drawn up in conformity with the provisions of the applicable technical documentation. Crimping pliers shall be periodically checked.

5.4 Performance of Non-Destructive[7] Testing (NDT)

Non-destructive tests (NDT) shall be carried out by qualified personnel in accordance with recognised international standards UNI, ASTM[8] and AWS[9] or in accordance with the Supplier's internal qualification procedures approved by a third level NDT operator in accordance with UNI EN ISO 9712.

5.5 Management of supplies from sub-tiers

If the supplier intends to manufacture finished parts or sub-assemblies whose implementation involves the execution of special processes that are not carried out within its organization, it shall use sub-tiers with third party qualifications or special process suppliers approved by Leonardo-SDI (listed in document QUA017-T).

In the event that the supplier does not have the internal capabilities or a sub-tier supply chain recognised by Leonardo-SDI to carry out the special process mentioned in the applicable technical documentation, it shall use sub-tiers who have been previously selected by Leonardo-SDI and are listed in the document QUA017-T.

The use of sub-tiers recognised by Leonardo-SDI does not relieve the supplier from carrying out the checks it is responsible for.

The supplier shall demonstrate that he is monitoring the special processes delegated to sub-contract by referring to them in the supply management documents and in accordance with document PQA004-L. The supplier is responsible for the entire sub-tier supply chain; any nonconformity of the chain will be attributed to it.

[7] These are techniques that make it possible to establish the integrity of a part or the success of a process through means of investigation that do not require the dissection or sacrifice of the piece;
[8] American Society for Testing Materials;
[9] American Welding Society;

The Supplier, after having verified and accepted, with objective evidence, the work carried out by its sub-tier, will provide Leonardo-SDI with quality documentation relating to the processes implemented by sub-tiers.

The Supplier shall:

- include in their purchase orders the prescriptions contained in the Quality Requirements and in the technical documentation applicable to Leonardo-SDI supplies, including the request for certificates;
- reference the sub-tier in the production management documentation for the phase (e.g. MCP), identifying the records related to the special process referred to;
- attach to the Leonardo-SDI supply the certifications required to provide the evidence required for that special process;
- carry out control activities on its suppliers using personnel with the appropriate competence.

The Supplier, following approval of the MCP by Leonardo-SDI, shall:

- request from the sub-tier, for the verifications of competence, the types of documents and records applicable to the supply within the time and with the contents requested and send them to Leonardo-SDI;
- prescribe the possibility of access to the production sites and to the documentation of the sub-tier supplier for Leonardo-SDI and for its Customer in the context of inspections and presence at tests and trials;
- inform Leonardo-SDI in advance and within an appropriate timeframe of any changes in sub-tiers for approval.