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Aerospace Quality Management System

PROCEDURE

Production and Service Work-Route Control

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Publication identity and application

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Use and document-control boundary

This companion implements the supplied AF 9100 requirement basis without changing the original standard. Its process allocation, examples, checklists and record design are authored implementation material. Actual mission or product limits, specialist procedures, permissions and genuine observations must be completed before consequential use. Applicable source minima and independent decision conditions cannot be reduced by this companion.

The printed edition date identifies the companion series; it is not evidence that later preparation, review or operational decisions occurred on that date. New support codes in this set are proposed allocations for controlled registration. Established AF-IG-9100-001, AF-FAQ-9100-001 and AF-TR-9100-001 identities are retained; earlier files, the corporate master list and ASTRA codes are not overwritten.

Equivalent combined or digital records are permitted when all required fields, relationships, authority and history remain intact. A completed PDF field or typed name is not evidence of an authenticated approval. Blank records in this delivery contain no invented applicant, signature, event or result.

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Select actual scope → complete application criteria → use the applicable procedure and technical book → capture authentic evidence → evaluate every applicable condition → obtain the required independent decision. Document availability does not establish implementation or conformity.

1 Scope, responsibility and source priority

Applies to the responsible function and exact evaluated object selected from the source. Use only the duties triggered by actual activity and retained responsibility.

Boundary	Required implementation decision
Object and route	Identify ORG, PRD, SVC, PRC, PER, SUB or CAB separately. Combined records do not merge outcomes.
Activity	Apply source technical modules by performed or retained responsibility, including relevant outsourced work.
Authority	Technical release, employer task permission, independent attestation and statutory authorization remain distinct.
Source priority	AF 9100:2026 and all compatible binding obligations control. This companion does not import ASTRA programme rules or external normative schemes.

2 Trigger, inputs and handover

Trigger: Release of a work order, execution across shifts, interruption or an abnormal process condition.

Accountable process owner: Production or service process owner. Actual named appointments and deputies are maintained locally.

Input to verify	Required output / receiving function
Exact request, object and source profile	Accepted scope and controlled work package, or a reasoned hold/refusal.
Current people, authority, data and equipment	Authorized assignment and evidence-access boundary.
Original execution, adverse evidence and source history	Attributable result, identified limitations and required action.
Relevant source clocks and actual event times	Genuine due/completion history and timely recipient communication.

3 Operating sequence

3.1 Release a complete work package

Connect actual order and configuration to current instructions, materials, equipment, competent people, hold points and acceptance plan. Reconcile departmental baselines before work starts.

3.2 Confirm readiness at use

Verify authorized tool and machine programs, actual material eligibility, environmental condition, qualification window and task authority for the shift and station.

3.3 Capture consequential steps

Record performer, event time, inputs, actual essential variables, results and deviations by output identity. Retain evidence of concealed or irreversible operations before they become unobservable.

3.4 Control identity and quantity

Preserve genealogy through split lots, merge, rework, partial completion and scrap. Record material consumption and the actual loaded software; a balance alone does not prove correct identity.

3.5 Manage interruptions and excursions

Mark incomplete work and active holds, reconcile tools and temporary conditions at handover, and investigate the affected interval from the last valid state after an excursion.

3.6 Verify completion and handover

Compare actual execution with every required operation and check. Transfer unresolved restrictions and evidence to the authorized release function; elapsed schedule or invoice completion is not technical completion.

4 Decision, interruption and escalation

An unverified essential operation, missing genealogy or out-of-window process remains held from acceptance.

State or event	Action and limit
Evidence valid and criteria met	Record the bounded result and pass it to the authorized receiving function; do not enlarge scope.
Evidence missing, invalid or inconclusive	Keep the dependent conclusion not yet demonstrated / HOLD, preserve the reason and define competent next work.
Valid evidence demonstrates failure	Record nonconformity and protect the affected population; follow actual technical disposition and source status controls.
Trigger genuinely absent	Record the exclusion and its approved responsibility basis. Resource shortages do not justify N/A.
Interrupted or changed work	Preserve prior state and actual configuration; complete impact and revalidation before claiming completion.

5 Required records and receiving checks

Document	Record purpose
AF-FR-9100-021	Production Route and First-Article Accountability
AF-FR-9100-022	Process Qualification, Execution and Requalification
AF-FR-9100-024	Contamination, Preservation and External Property
AF-FR-9100-025	Product Release, Labeling and Delivery Dossier

At handover the receiver checks object, scope, current version, original evidence, open conditions, true event chronology and the action they may authorize. An email sent, field marked complete or invoice paid is not acceptance of that handover.

6 Worked case and adverse challenge

Synthetic scenario: The final functional test passes after a required concealed assembly check was missed.

Required reasoning: Determine whether the final test can validly establish that hidden characteristic. Preserve the gap and obtain an approved evidence path; do not insert a retrospective inspection signature.

Challenge before local use	Expected behavior
Missing essential input	Dependent conclusion remains held; no favorable default.
Wrong configuration or performer	Detect the mismatch and reassess relevant evidence.
Expired or conflicted authority	Block the prohibited assignment or decision; later renewal cannot validate earlier unauthorized work.

Challenge before local use	Expected behavior
Failed mandatory condition with high total score	No compensation; preserve the failure and required action.
Correction without original history	Reject an apparent closure that erases relevant earlier evidence.

Appendix A — Controlling source and evidence

Source: AF 9100:2026, Aerospace Quality Management System, FIRST EDITION, 29 September 2026; supplied 131-page PDF. Source page references below locate the original publication. These excerpts are read with the complete applicable standard; local implementation sequences do not replace it.

8.1 Integrated operational planning

SOURCE p. 20 | Normative when applicable

8.1(a) The organization shall translate requirements into an executable program or order plan covering responsibilities, resources, lifecycle stages, work packages, suppliers, verification, validation, acceptance and delivery. Planning shall address producibility, inspectability, reliability, maintainability, safety, software, obsolescence, preservation and end-of-life obligations as relevant.

8.1(b) Critical items, key characteristics and special requirements shall be identified early and connected to control plans. The plan shall identify required evidence and hold points before the affected work begins. Changes in schedule or resources shall trigger a review of the continuing adequacy of the plan.

8.1(c) The organization shall verify consistency among the contract, technical baseline, purchasing requirements, manufacturing or service instructions and acceptance plan. A discrepancy shall be resolved before the affected activity proceeds. Work shall not be released merely because each department has approved a different interpretation.

Required evidence: Program assurance plan; work packages; control plans; integrated schedule; baseline consistency review.

8.1.1 Operational risk management

SOURCE p. 20 | Normative when applicable

8.1.1(a) For each program, order or family of work, the organization shall identify operational risks to requirements, delivery and lifecycle outcomes. The assessment shall cover new technology, difficult characteristics, supplier capability, work transfers, maintenance constraints and changes in the intended environment.

8.1.1(b) The organization shall establish risk criteria, ownership, mitigation actions and residual-risk approval before the relevant gate. Risk records shall be updated when test evidence, nonconformities or field experience change the likelihood or consequence basis. A closed mitigation action shall be distinguished from demonstrated risk reduction.

Required evidence: Program risk register; mitigation verification; residual-risk acceptance; changes based on new evidence.

8.1.2 Configuration management

SOURCE p. 20 | Normative when applicable

8.1.2(a) The organization shall establish configuration identification, baseline control, change control, status accounting and configuration verification across hardware, software, models, manufacturing data and service information. The configuration structure shall identify relevant interfaces and distinguish as-designed, as-planned, as-built, as-tested, as-delivered and as-maintained states.

8.1.2(b) Changes shall be assessed for effects on fit, form, function, safety, interchangeability, qualification, maintenance, cybersecurity, traceability and customer obligations. The affected population and implementation point shall be identifiable. Mixed configurations shall be prevented unless their compatibility is specifically justified.

8.1.2(c) Configuration audits shall reconcile physical and digital evidence against approved baselines. Unauthorized substitutions or unexplained version differences shall be treated as nonconformities. A digital twin or model of record shall not conceal a discrepancy in the physical item.

Required evidence: Configuration plan; item hierarchy; baselines; change board decisions; status accounting; configuration audits.

8.1.3 Product safety and mission-critical controls

SOURCE p. 20 | Normative when applicable

8.1.3(a) The organization shall identify product and service hazards throughout the lifecycle, including interfaces, foreseeable misuse, maintenance, transport, abnormal modes and retirement. Safety responsibilities shall extend to suppliers and field support within the organization's scope.

8.1.3(b) Safety-critical items and functions shall have explicit controls, acceptance criteria, independent review and traceability to hazard mitigations. Changes, concessions and nonconformities affecting these controls shall receive safety impact assessment before disposition. A generic quality approval shall not substitute for the required safety decision.

8.1.3(c) The organization shall provide relevant safety information to users, maintainers and downstream organizations, monitor safety-related events and support timely corrective action. Safety concerns shall be escalated even when the contractual acceptance criteria appear to have been met.

Required evidence: Hazard log; safety-control traceability; independent reviews; safety communications; in-service event assessments.

8.1.4 Counterfeit and unapproved-item prevention

SOURCE p. 21 | Normative when applicable

8.1.4(a) The organization shall assess counterfeit and unapproved-item risk for materials, parts, electronic components, software licenses, calibration records and certificates. Procurement preference, source approval, authenticity checks and testing shall be proportionate to consequence and supply risk.

8.1.4(b) Source identity, authorized-channel evidence, original manufacturer information and chain of custody shall be verified where relevant. A certificate alone shall not be accepted without evaluation of its origin, scope, consistency and credibility. Brokers and obsolete components shall receive additional controls when risks justify them.

8.1.4(c) Suspect items shall be segregated and positively controlled to prevent use or re-entry into the supply chain. Investigation, notification, preservation of evidence and disposition shall follow applicable obligations. Returning suspect material to the supplier without controls shall not be the default disposition.

Required evidence: Authenticity-risk assessment; approved sources; incoming verification; suspect-item records and disposition.

8.1.5 Temporary and permanent work transfer

SOURCE p. 21 | Normative when applicable

8.1.5(a) The organization shall plan transfer of work between sites, suppliers, equipment, production lines or service locations. The transfer plan shall identify baseline data, process capability, competence, tooling, environmental conditions, technical support, traceability and delivery-continuity risks.

8.1.5(b) Transferred work shall undergo appropriate first article, process requalification or service-capability verification before unrestricted release. The receiving source shall demonstrate actual capability; the sending source's records alone shall not establish equivalence. Early production shall be monitored against defined exit criteria.

Required evidence: Transfer plan; receiving-site readiness; qualification evidence; initial-output monitoring and closure.

8.5 Production and service execution

SOURCE p. 24 | Normative when applicable

8.5(a) The organization shall apply 8.5.1–8.5.6 to the controlled execution, identification, preservation, support and modification of its outputs. Special processes and first article verification shall be triggered by the actual work rather than omitted because a supplier or customer performs part of the activity.

Required evidence: Controlled work routes; actual execution; identity, preservation, support and change records.

8.5.1 Controlled production and service execution

SOURCE p. 24 | Normative when applicable

8.5.1(a) Production and service work shall use approved instructions, suitable equipment, competent personnel and defined environmental conditions. Instructions shall identify required characteristics, sequence, workmanship criteria, inspection points, process limits and authorized alternatives.

8.5.1(b) The organization shall maintain accountability for quantities and configuration through split lots, rework, scrap and partial completion. Critical items and key characteristics shall be controlled at points where their conformity can be established. A later inspection shall not be presumed to detect every earlier process failure.

8.5.1(c) Evidence shall show completion of required operations and acceptance activities. Utilities, consumables, tools and software affecting output shall be controlled. Error prevention, FOD prevention and identification of work

awaiting verification shall be integrated into the process.

Required evidence: Controlled route or work package; process records; in-process verification; quantity reconciliation; FOD and utility controls.

8.5.1.1 Equipment, tooling and production software

SOURCE p. 24 | Normative when applicable

8.5.1.1(a) Equipment, tooling, fixtures and software used to create, control, inspect or measure outputs shall be verified or validated before release for use. The assessment shall include the actual application, configuration, interfaces, failure behavior and ability to maintain required characteristics.

8.5.1.1(b) Maintenance, storage, preservation and periodic condition checks shall be defined. Tool repairs, software updates, relocation and changes to compensation parameters shall trigger an impact-based revalidation decision. Access to editable machine programs shall be restricted and changes traceable.

Required evidence: Tool and software qualification; controlled programs; maintenance; storage checks; revalidation records.

8.5.1.2 Special-process validation and control

SOURCE p. 24 | Normative when applicable

8.5.1.2(a) Special processes shall have approved methods, qualified personnel, suitable equipment, validated parameter windows and defined acceptance and monitoring criteria. Qualification shall demonstrate that relevant output characteristics can be achieved reproducibly under the proposed operating conditions.

8.5.1.2(b) The organization shall define conditions for maintaining approval, monitoring essential variables, retaining records and requalification. Changes to material, geometry, equipment, software, consumables or location shall be evaluated. Final visual inspection alone shall not replace control of hidden or irreversible characteristics.

Required evidence: Special-process qualification dossier; approved parameter ranges; operator qualifications; run records; requalification decisions.

8.5.1.3 Production-process and first article verification

SOURCE p. 24 | Normative when applicable

8.5.1.3(a) The organization shall verify that the planned production route, documentation, equipment and tooling can produce an item meeting requirements. Verification shall use a representative item or other justified approach and account for every applicable characteristic, including material, process, software and interface requirements.

8.5.1.3(b) Repeat verification shall be considered after design, process, source, tooling or location changes, significant interruption or evidence that previous results no longer represent production. Partial verification shall identify and justify the unaffected portion. Approval of first article evidence shall not authorize later process drift.

Required evidence: First article record; characteristic accountability; material/process evidence; differences and repeat-verification rationale.

8.5.2 Identification, status and traceability

SOURCE p. 24 | Normative when applicable

8.5.2(a) Outputs shall be identified sufficiently to establish their configuration and acceptance status throughout the lifecycle. Where traceability is required, identity shall link material origin, lots, serials, processing, personnel, inspection, software versions and disposition as relevant to consequence and obligations.

8.5.2(b) Traceability shall survive splitting, combining, packaging changes, repairs and movement between systems. Acceptance stamps, passwords and electronic signatures shall be controlled. The organization shall periodically demonstrate that a suspect source or process event can be traced to the affected population and that an item can be traced back to its evidence.

Required evidence: Identity scheme; genealogy records; status controls; signature register; forward and reverse trace exercises.

8.5.3 Customer and external-provider property

SOURCE p. 25 | Normative when applicable

8.5.3(a) Property under the organization's control shall be identified, protected and used only as authorized. This includes physical items, tooling, intellectual property, technical data, software, personal information and access

credentials.

8.5.3(b) Loss, damage, unsuitable condition or unauthorized use shall be reported to the owner through the agreed channel and recorded. The organization shall preserve evidence and assess product or service impact rather than treating the issue solely as an administrative property loss.

Required evidence: Property register; receipt checks; access controls; condition and incident records.

8.5.4 Preservation, packaging and transport

SOURCE p. 25 | Normative when applicable

8.5.4(a) The organization shall preserve conformity during handling, storage, packaging and transport. Controls shall address cleanliness, FOD, humidity, temperature, corrosion, ESD, shock, shelf life, material compatibility, hazardous conditions and stock rotation as applicable.

8.5.4(b) Packaging methods shall be qualified for the actual route and exposure where risk warrants. Excursions or damaged packaging shall trigger a product assessment. Expired, life-limited or environmentally exposed material shall not be returned to normal stock without an authorized disposition based on technical evidence.

Required evidence: Preservation specifications; packaging qualification; environmental history; shelf-life controls; excursion dispositions.

8.5.5 Post-delivery support and field feedback

SOURCE p. 25 | Normative when applicable

8.5.5(a) The organization shall define support responsibilities for installation, operation, training, maintenance, repair, warranty, spare parts, software updates and obsolescence within the agreed lifecycle. Technical information shall be controlled and updated when experience changes safe or effective use.

8.5.5(b) Field performance and failures shall be collected and analyzed with exposure and configuration context. A detected problem shall trigger investigation, communication and appropriate containment of the affected population. Off-site work shall meet the same applicable controls as equivalent work at the main facility.

Required evidence: Support plan; service information; field reliability data; notifications; off-site work controls.

8.5.6 Production and service changes

SOURCE p. 25 | Normative when applicable

8.5.6(a) Production and service changes shall be reviewed and authorized by competent persons with defined authority. The review shall consider changes to output characteristics, process capability, hidden features, qualification, measurement, configuration and contractual approvals.

8.5.6(b) Emergency changes shall have temporary limits, additional checks and an expiry or conversion decision. The organization shall retain the baseline, change rationale, approval and verification of the changed output. A change implemented to restore delivery shall not bypass required design approval.

Required evidence: Process-change record; technical impact; approvals; temporary controls; changed-output verification.

25.5 Monitoring, drift and excursions

SOURCE p. 45 | Normative when applicable

25.5(a) Monitoring shall detect relevant drift, tool wear, environmental changes, material variability, software changes and loss of operator capability. Response plans shall identify the last demonstrated valid state, potentially affected output and conditions requiring immediate hold.

25.5(b) An excursion shall be evaluated against the relevant failure mechanism. Additional inspection may support disposition only when it can detect the potential effect. Restoring process settings or obtaining one conforming sample shall not retrospectively demonstrate conformity of the affected population.

Required evidence: Monitoring records; reaction plan; affected-population trace; technically justified disposition and restart.

Appendix B — Local implementation and release

Readiness condition	Evidence before consequential use
Authority and responsibility	Actual legal operator, owner, competent technical authority, independent reviewer and permitted result class are recorded.
Scope and criteria	Object, configuration, site, period, trigger, every technical value or observable attribute, units and prospective approval are complete.
Evidence and methods	Original accessible evidence, representative observations, valid methods, uncertainty, adverse cases and limitations support the intended conclusion.
People and independence	Competence is current for each task; genuine conflicts, relevant prior work and needed separation have been checked.
Records and tools	Field meanings, unique IDs, original history, access, retention, recovery and actual deployed workflows have passed local validation.
Decision and public use	All relevant blockers are resolved; required independent decision and written permissions precede the exact public claim.
Continuity and handover	Receiving custody, unresolved duties, corrections and historical decisions survive transfer, retirement or provider closure.

Record the completed local readiness and actual authorization in AF-FR-9100-032 or an equivalent controlled record. Preserve the unchanged source standard and each earlier decision basis. A blocked activity may continue only within a genuinely permitted development boundary, not as a provisional conformity certificate.