



AF 9100:2026

Aerospace Quality Management System

PROCEDURE

Verification Campaigns, NDT and Test Reporting

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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: A test, inspection, analysis, demonstration, method transfer or retest supports a technical claim.

Accountable process owner: Verification and laboratory technical authority. 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 Map requirements to methods

Identify every applicable characteristic, exact configuration, purpose, method and acceptance rule. Distinguish qualification, routine acceptance, research and provider competence.

3.2 Establish representativeness

Record specimen origin, geometry, preparation, fixture, modes, cumulative exposure and differences from the delivered article. Justify similarity per characteristic and failure mechanism.

3.3 Approve readiness

Verify current procedure, actual limits, competent authorized people, valid instrumentation, bandwidth, timing, calibration, uncertainty and original-data capture. Protective stops and technical acceptance are separate.

3.4 Execute and preserve

Capture raw inputs and responses, conditions, operator, method version, deviations, interruptions and alarms. Label simulated or model-derived results and expose inaccessible features.

3.5 Classify validity and retest

Determine whether the run is valid before assigning conformity. Retain original failures and an approved rationale for changed articles, repair, repeat exposure and regression; no testing until a favorable result appears.

3.6 Review and report bounded results

Reconcile every requirement with usable evidence, limitations and technical disposition. Identify actual performer and subcontracted results. Provider capability, product qualification and independent attestation remain different conclusions.

4 Decision, interruption and escalation

Missing critical channel, unqualified detection or unrepresentative evidence holds the dependent result.

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-9100-005	Technical Result and Decision Rule
AF-FR-9100-018	Calibration, Method Validity and Uncertainty Budget
AF-FR-9100-023	Sample, Verification Campaign and Technical Report
AF-FR-9100-006	Nonconformity, Containment and Corrective Action

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: One NDT demonstration detects an easy reference flaw and is claimed to prove all installed defects are detectable.

Required reasoning: Restrict the conclusion to the demonstrated material, geometry, access and technique. Establish representative defect and statistical evidence before a broader detection claim.

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.

Challenge before local use	Expected behavior
Expired or conflicted authority	Block the prohibited assignment or decision; later renewal cannot validate earlier unauthorized work.
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.

8.3.4 Design review, verification and validation

SOURCE p. 22 | Normative when applicable

8.3.4(a) Reviews shall evaluate whether the design can fulfill requirements and whether evidence and unresolved issues justify progression. Verification shall demonstrate that outputs satisfy specified inputs; validation shall demonstrate suitability for intended use in a representative context. These activities shall not be treated as interchangeable.

8.3.4(b) Test plans shall identify the test item and configuration, objectives, methods, environment, equipment, uncertainty, data to retain, acceptance criteria and anomaly handling. Test readiness shall be approved before execution. Deviations from the plan shall be recorded and evaluated for their effect on validity.

8.3.4(c) Analysis and simulation used as evidence shall have a justified model, validated range, input provenance, sensitivity analysis and uncertainty treatment. Completion of design shall require evidence covering identified operating conditions and interfaces; untested or unanalyzed conditions shall be explicitly bounded or resolved.

Required evidence: Review records; requirements-to-evidence matrix; approved test plans; raw data; model credibility; anomaly dispositions.

11.6 Verification strategy and model credibility

SOURCE p. 28 | Normative when applicable

11.6(a) The organization shall select inspection, analysis, demonstration and testing methods capable of establishing each requirement. The selected method shall address representativeness, observability, uncertainty, test-article differences and required confidence.

11.6(b) For models and simulations, credibility shall be established for the stated decision use. Verification of implementation, validation against relevant observations, input quality, sensitivity and uncertainty shall be addressed. Extrapolation beyond the demonstrated domain shall be identified and approved with compensating evidence.

Required evidence: Verification matrix; method-selection rationale; model-credibility dossier; approved extrapolations.

14.2 Space environment and qualification rationale

SOURCE p. 32 | Normative when applicable

14.2(a) The organization shall identify relevant mechanical, thermal, vacuum, radiation, electrical, electromagnetic, charging, contamination and material-degradation environments. Requirements and test levels shall be derived from the actual mission and approved technical basis.

14.2(b) Qualification and acceptance test strategies shall distinguish design demonstration from workmanship screening. Test-article representativeness, margins, notching or limitation decisions, cumulative exposure and over-test risk shall be assessed. No universal test profile is specified by this standard.

Required evidence: Environmental specification; qualification matrix; test-article differences; margin and exposure rationale.

18.6 NDT, inspection capability and probability of detection

SOURCE p. 37 | Normative when applicable

18.6(a) NDT methods shall be qualified for the relevant material, geometry, defect type, size range and access condition. Personnel, equipment, reference artifacts, procedures and environmental conditions shall be controlled.

18.6(b) Where detection capability is used quantitatively in an integrity argument, the organization shall establish a statistically and physically justified evaluation with uncertainty and representative defects. A nominal detectable flaw size or a single successful demonstration shall not establish a probability-of-detection claim.

Required evidence: NDT procedure qualification; personnel authorization; reference-artifact control; detection capability and limitations.

M.1 Verification-method and acceptance planning

SOURCE p. 73 | Normative when applicable

M.1(a) The organization shall identify the requirement, method, configuration, conditions, equipment, data, uncertainty, acceptance rule and responsible reviewer for each verification activity. Acceptance and abort criteria shall be defined before execution.

M.1(b) The test basis shall justify environmental profiles and margins using the actual duty, applicable technical requirements and limitations of the test article. This standard does not prescribe a single vibration, shock, fire, thermal-vacuum, EMC or load profile for every product.

M.2 Anomalies, retest and evidence exclusion

SOURCE p. 73 | Normative when applicable

M.2(a) Test anomalies shall be recorded with actual conditions and potential effects on validity. The decision to repeat, modify or exclude a result shall be technically justified and approved. All original results shall remain traceable.

M.2(b) Retesting after a repair or software change shall identify the changed configuration and the extent of regression needed. Repeating only the previously failed check shall not be sufficient when the change can affect other requirements. A pass after uncontrolled tuning shall not be represented as the result of the original plan.

M.3 Qualification by similarity and analysis

SOURCE p. 74 | Normative when applicable

M.3(a) Use of similarity shall identify the reference article, verified evidence, differences and their effects on relevant failure mechanisms. The organization shall demonstrate that the prior evidence bounds the new configuration and conditions.

M.3(b) Analysis-based acceptance shall record the model, assumptions, validation, uncertainty and sensitivity. An independent reviewer shall be able to reproduce material calculations from the retained inputs. Unsupported similarity statements shall remain open evidence gaps.

AH.4 Test and calibration method validity

SOURCE p. 123 | Normative when applicable

AH.4(a) The laboratory shall select methods suitable for the actual measurand, item, range, environment and decision. A new or materially modified method shall be validated; an established method shall be verified for the laboratory's actual implementation. Performance characteristics shall address bias, precision, selectivity, range, detection capability and robustness where relevant.

AH.4(b) Measurement traceability shall use an appropriate documented chain of calibrations, reference materials or other justified references with their uncertainty contributions. Equipment shall be identified, maintained and verified after relevant change. An expired calibration or unsuitable range shall trigger assessment of affected previous results, not only a new calibration.

AH.4(c) Uncertainty shall be evaluated to the extent needed for the report and intended decision. Sampling contributions shall be addressed when sampling belongs to the laboratory's responsibility. Tests reporting qualitative outcomes shall still evaluate the relevant capability to distinguish conditions and avoid false conclusions.

Required evidence: Method validation/verification; measurement traceability; equipment status; uncertainty and detection capability; previous-result impact reviews.

AH.5 Samples, execution and continuing validity of results

SOURCE p. 124 | Normative when applicable

AH.5(a) The provider shall control sample receipt, unique identity, condition, requested work, storage, preparation, chain of custody, consumption and disposal. Deviations from requested conditions shall be resolved before using results for a claim. Raw data shall identify the item, method, equipment, personnel and actual conditions.

AH.5(b) Continuing validity shall be monitored using suitable reference checks, control samples, repeated or blind tests, interlaboratory comparison, proficiency activities or technically justified alternatives. The program shall cover significant technical scopes at justified intervals and respond to adverse results. Participation alone shall not establish competence when performance is unsatisfactory.

AH.5(c) Data-processing software and calculation tools shall be verified. Manual transcription, unit conversion, automated interfaces and electronic signatures shall be controlled. A report shall be amended when a material error is identified, preserving the earlier version and notifying affected users.

Required evidence: Sample and custody records; raw data; validity-monitoring program; comparison results; verified data processing; corrected reports.

Source tables — complete field and decision payloads

Table M-1 — Test-plan and report data requirements

Source p. 73 | Required structure when applicable

Area	Required content
Identity	Program; requirement IDs; test/report IDs; revision; article serial/lot; hardware/software configuration.
Objective	Claim being evaluated; acceptance criteria; excluded claims; required confidence or coverage.
Method	Procedure; setup; sequence; conditioning; instrumentation; sampling; data processing; approved deviations.
Environment	Relevant physical conditions, profiles, tolerances, duration, interfaces and monitoring locations.
Measurement	Equipment identity, calibration, range, resolution, uncertainty, correction and decision rule.
Safety and authority	Test authorization, hazards, limits, abort criteria, emergency arrangements and responsible personnel.
Execution	Actual date/time, performer, observations, raw data, environmental records, anomalies and interruptions.
Analysis	Calculations, software/tools, assumptions, exclusions, uncertainty, comparison with criteria and limitations.
Review	Technical review, independent review when required, anomaly disposition and authorized conclusion.
Retention	Raw and processed data, configuration, photographs where useful, records location, access and retention.

Table M-2 — Qualification-domain matrix

Source p. 73 | Required structure when applicable

Domain	Program-specific basis to establish	Evidence limitations to address
Mechanical / structural	Loads, dynamics, fatigue duty, attachment, shock/vibration and structural acceptance.	Boundary conditions, scaling, article representativeness and cumulative damage.
Thermal / climatic	Temperature, humidity, icing, dust, salt, altitude and cycling as applicable.	Dwell, gradients, condensation, combined environments and service duration.
Space environment	Vacuum, thermal balance/cycling, radiation, charging and contamination.	Mission equivalence, dosimetry, material behavior and inaccessible damage.
Electrical / EMC	Power quality, transients, emissions, immunity, grounding, ESD and relevant external fields.	Installation effects, cable configuration, modes, frequency coverage and failure criteria.

Domain	Program-specific basis to establish	Evidence limitations to address
Fire / hazardous energy	Applicable ignition, containment, propagation, smoke or emergency requirements.	Scale, ventilation, material state, energy inventory and authorized facility capability.
Software / digital	Requirements, interfaces, timing, robustness, security and configuration.	Coverage, target equivalence, systematic defects and tool limitations.
AI / autonomy	Domain, scenario coverage, data quality, performance, fallback and intervention.	Distribution shift, rare conditions, confidence and authority boundaries.
Human-system / operations	Representative users, tasks, workload, emergency and maintenance conditions.	Participant representativeness, learning effects and simulated-environment limits.

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.