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Aerospace Quality Management System

TECHNICAL PROFILE BOOK

Space Systems, Mission Operations and Remote Assurance — Technical Application Book

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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.

Contents and reading route

Publication identity and application	2
Contents and reading route	3
1 Scope, responsibility and source priority	4
2 Technical profile and prospective parameter completion	4
3 Subject-by-subject implementation	4
4 Representative evaluation and adverse evidence	6
5 Interface records, decisions and continuing use	6
Appendix A — Controlling source and evidence	7
Source tables — complete field and decision payloads	10
Appendix B — Local implementation and release	11

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

Spacecraft, payloads, launch and ground interfaces, environmental qualification, orbital responsibilities, human interfaces, surface mobility, servicing and in-space manufacture.

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 Technical profile and prospective parameter completion

Mission environment and uncertainty; duration; repairability; article difference; radiation mechanisms; contamination limits; telemetry observability; resources; terminal-state criteria

Parameter record	Content required before evaluating results
Identity and trigger	Stable criterion ID, source anchor, owner, actual object, phase, mode and reason it applies.
Limit or attribute	Value/range with compatible units and boundary convention, or an observable state with every essential step.
Technical basis	Actual environment, duty, consequence, derivation, qualified evidence and relevant approval.
Method and representation	Inspection, analysis, demonstration or test; method version, article/population, configuration and validity limits.
Uncertainty and decision	Corrections, model, covariance, coverage, pre-agreed rule, sample/scoring logic and hold conditions.
Authority and change	Technical and independent approvals, actual effectivity, preserved earlier basis and reopening triggers.

The fields above are completed for the actual application. A blank limit, undefined domain or unvalidated method prevents the dependent claim; the book deliberately does not invent one severity, tolerance or task threshold for unrelated applications.

3 Subject-by-subject implementation

14.1 — Space program and mission-product assurance

Source p. 32; complete conditions reproduced in Appendix A.

Implementation record: Space assurance plan; mission interface allocation; environmental and lifecycle assumptions; gate evidence.

Application check: Review every source clause and normative annex against actual activity and retained outsourced responsibility. Record affirmative triggers and reasoned exclusions; lack of resources, a small workforce or another certificate is not an exclusion rationale.

Review boundary: An undefined object, unjustified exclusion or unresolved essential criterion holds admission or acceptance. Record each source condition separately in the linked checklist and preserve approved exclusions.

14.2 — Space environment and qualification rationale

Source p. 32; complete conditions reproduced in Appendix A.

Implementation record: Environmental specification; qualification matrix; test-article differences; margin and exposure rationale.

Application check: 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.

Review boundary: Missing critical channel, unqualified detection or unrepresentative evidence holds the dependent result. Record each source condition separately in the linked checklist and preserve approved exclusions.

14.3 — Components, materials and contamination control

Source p. 32; complete conditions reproduced in Appendix A.

Implementation record: Parts and materials lists; environmental suitability; contamination plan; applicable protection-control evidence.

Application check: Review every source clause and normative annex against actual activity and retained outsourced responsibility. Record affirmative triggers and reasoned exclusions; lack of resources, a small workforce or another certificate is not an exclusion rationale.

Review boundary: An undefined object, unjustified exclusion or unresolved essential criterion holds admission or acceptance. Record each source condition separately in the linked checklist and preserve approved exclusions.

14.4 — Ground segment, command and mission operations

Source p. 32; complete conditions reproduced in Appendix A.

Implementation record: Ground-segment baseline; command-authority rules; rehearsals; anomaly procedures; telemetry interpretation limits.

Application check: Review every source clause and normative annex against actual activity and retained outsourced responsibility. Record affirmative triggers and reasoned exclusions; lack of resources, a small workforce or another certificate is not an exclusion rationale.

Review boundary: An undefined object, unjustified exclusion or unresolved essential criterion holds admission or acceptance. Record each source condition separately in the linked checklist and preserve approved exclusions.

14.5 — Orbital responsibility and end-of-life planning

Source p. 32; complete conditions reproduced in Appendix A.

Implementation record: Responsibility allocation; disposal concept; resource budgets; failure cases; end-of-life decision and verification records.

Application check: Review every source clause and normative annex against actual activity and retained outsourced responsibility. Record affirmative triggers and reasoned exclusions; lack of resources, a small workforce or another certificate is not an exclusion rationale.

Review boundary: An undefined object, unjustified exclusion or unresolved essential criterion holds admission or acceptance. Record each source condition separately in the linked checklist and preserve approved exclusions.

14.6 — Human spaceflight and habitation interfaces

Source p. 33; complete conditions reproduced in Appendix A.

Implementation record: Human-system requirements; life-support interface assurance; emergency scenarios; independent review; integrated validation.

Application check: Review every source clause and normative annex against actual activity and retained outsourced responsibility. Record affirmative triggers and reasoned exclusions; lack of resources, a small workforce or another certificate is not an exclusion rationale.

Review boundary: An undefined object, unjustified exclusion or unresolved essential criterion holds admission or acceptance. Record each source condition separately in the linked checklist and preserve approved exclusions.

14.7 — Surface mobility, in-space servicing and manufacturing

Source p. 33; complete conditions reproduced in Appendix A.

Implementation record: Surface or servicing concept; environment-specific qualification; remote acceptance strategy; safe-state and evidence limitations.

Application check: Review every source clause and normative annex against actual activity and retained outsourced responsibility. Record affirmative triggers and reasoned exclusions; lack of resources, a small workforce or another certificate is not an exclusion rationale.

Review boundary: An undefined object, unjustified exclusion or unresolved essential criterion holds admission or acceptance. Record each source condition separately in the linked checklist and preserve approved exclusions.

4 Representative evaluation and adverse evidence

Design, Systems Engineering and Lifecycle Gates

Witness or trace: Review hazards, common causes, resource budgets and assumptions. Validate models for their exact decision domain; identify where simulation cannot observe or bound an essential physical property.

Synthetic challenge: A component qualifies on the bench but the installation changes cooling and power supply. Retain only relevant unchanged evidence. Add installation-specific verification and update hazards and support instructions before an integrated-system conclusion.

Verification Campaigns, NDT and Test Reporting

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

Synthetic challenge: One NDT demonstration detects an easy reference flaw and is claimed to prove all installed defects are detectable. Restrict the conclusion to the demonstrated material, geometry, access and technique. Establish representative defect and statistical evidence before a broader detection claim.

Continuity, Emergency Interfaces and Assured Recovery

Witness or trace: Record real event chronology, affected configurations and outputs, original evidence and required notices. Keep protective operations distinct from investigation and public status administration.

Synthetic challenge: An exercise meets RTO 4 h and RPO 1 h but loses a configuration link. Record the time objectives as met and assured use as held. Correct and repeat the relationship check before accepting recovery.

5 Interface records, decisions and continuing use

Record	Required implementation purpose
AF-FR-9100-016	Design, Interfaces, Gates and Engineering Budgets
AF-FR-9100-023	Sample, Verification Campaign and Technical Report
AF-FR-9100-014	Risk, Hazard, Criticality and Residual Decision

Qualification, instance acceptance, current operating capability and independent attestation retain separate evidence and decisions. A new site, material, supplier, digital load, use environment or duty requires a relevant difference and requalification review. No previous result transfers automatically because the name is unchanged.

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.

14.1 Space program and mission-product assurance

SOURCE p. 32 | Normative when applicable

14.1(a) Space programs shall define product and mission assurance across spacecraft, payload, launch interfaces, ground segments, communication links and operations. Responsibility for each interface and lifecycle decision shall be established before integration.

14.1(b) The assurance plan shall address mission duration, repairability, access limitations, launch exposure, environmental extremes, reliability, contamination, software updates and end-of-life constraints. A commercial or rapid-development schedule shall not remove necessary evidence for an irreversible mission decision.

Required evidence: Space assurance plan; mission interface allocation; environmental and lifecycle assumptions; gate evidence.

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.

14.3 Components, materials and contamination control

SOURCE p. 32 | Normative when applicable

14.3(a) Critical components and materials shall have evidence appropriate to mission consequence, including provenance, process control, screening, derating, radiation susceptibility or other environment-specific properties as applicable. Commercial components shall be assessed for the intended use rather than accepted or rejected by label alone.

14.3(b) Contamination control shall address particulate, molecular and biological concerns where relevant. Materials, cleaning, storage, integration and transport shall preserve the required condition. When planetary-protection obligations apply, responsibilities and verified controls shall be recorded without substituting an AF declaration for the required authorization.

Required evidence: Parts and materials lists; environmental suitability; contamination plan; applicable protection-control evidence.

14.4 Ground segment, command and mission operations

SOURCE p. 32 | Normative when applicable

14.4(a) Ground systems and operational procedures shall be configuration controlled and validated for normal, degraded and emergency modes. Command authority, authentication, timing, data integrity and prevention of unintended actions shall be addressed.

14.4(b) Operational readiness shall include training, rehearsals, anomaly response, time synchronization, communication outages and handovers. Critical commands shall have suitable review or protective controls. Telemetry limitations shall be understood before using telemetry absence as evidence that a hazardous condition is absent.

Required evidence: Ground-segment baseline; command-authority rules; rehearsals; anomaly procedures; telemetry interpretation limits.

14.5 Orbital responsibility and end-of-life planning

SOURCE p. 32 | Normative when applicable

14.5(a) The organization shall identify applicable responsibilities for tracking, coordination, collision-risk information, debris prevention, disposal and re-entry. Plans shall be established early enough to affect design and resource allocation.

14.5(b) End-of-life capability shall be assessed against credible failures and remaining resources. Disposal success shall not be assumed solely from nominal mission performance. Changes in mission duration, orbit or operating strategy shall trigger reassessment. Public statements about disposal or sustainability shall identify assumptions and uncertainty.

Required evidence: Responsibility allocation; disposal concept; resource budgets; failure cases; end-of-life decision and verification records.

14.6 Human spaceflight and habitation interfaces

SOURCE p. 33 | Normative when applicable

14.6(a) Where people are exposed to spaceflight or habitation systems, the organization shall identify life-support, habitability, crew interface, emergency response, medical-support interface and rescue or safe-return assumptions within its responsibility. Human-centered evaluation shall address workload, fatigue, communication delay and maintainability.

14.6(b) Independent safety review and integrated testing shall be matched to consequence. Crew or passenger acceptance of risk shall not replace required technical controls or authorizations. Degraded conditions and loss of a supporting service shall be included in validation.

Required evidence: Human-system requirements; life-support interface assurance; emergency scenarios; independent review; integrated validation.

14.7 Surface mobility, in-space servicing and manufacturing

SOURCE p. 33 | Normative when applicable

14.7(a) Lunar, planetary and other space-purpose vehicles shall be treated as mission systems, including mobility, energy, autonomy, communications, dust or contamination, maintainability and support interfaces. Terrestrial automotive qualification shall not be assumed valid for the space environment.

14.7(b) In-space servicing, robotic assembly and manufacturing shall define inspection access, remote verification, material behavior, configuration control and abort or safe-state conditions. Where physical retrieval is impossible, evidence strategy shall be established before deployment and shall acknowledge unresolved observability limits.

Required evidence: Surface or servicing concept; environment-specific qualification; remote acceptance strategy; safe-state and evidence limitations.

P.1 Mission assurance baseline

SOURCE p. 78 | Normative when applicable

P.1(a) The program shall maintain an assurance matrix linking each applicable topic in Table P-1 to requirements, technical basis, evidence, owner and decision gate. Non-applicability shall be justified against the mission concept and interfaces.

P.1(b) The matrix shall be updated for mission extensions, changed orbit or surface environment, alternate launch arrangements, payload changes, software updates and changed end-of-life assumptions. Critical resource margins shall be reconciled with the actual configuration.

P.2 Qualification, acceptance and mission readiness

SOURCE p. 79 | Normative when applicable

P.2(a) The program shall distinguish qualification evidence supporting the design from acceptance evidence supporting an individual flight or mission article. Differences in configuration, workmanship, environment and accumulated exposure shall be assessed.

P.2(b) Before an irreversible mission action, the decision authority shall confirm required evidence, configuration, critical margins, ground readiness, unresolved anomalies and contingency capability. Waivers or deviations shall identify the exact obligation and authorized acceptance; they shall not erase mandatory approvals.

P.3 Space-purpose automotive and mobile systems

SOURCE p. 79 | Normative when applicable

P.3(a) Space-purpose vehicles shall have a requirements basis that addresses actual mission environment and support constraints. Use of automotive components shall include assessment of vacuum, thermal, radiation, dust, lubrication, material compatibility and inaccessible maintenance as relevant.

P.3(b) The vehicle's autonomy, energy and communications shall be evaluated as a coupled mission system. A terrestrial road test may provide useful evidence for a specific mechanism but shall not be represented as complete space qualification. The evidence matrix shall state what transfers and what does not.

P.4 End-of-life and mission-extension decision record

SOURCE p. 79 | Normative when applicable

P.4(a) A mission-extension record shall identify current condition, remaining resources, updated environment, changed obligations, failure trends and disposal feasibility. It shall show that continued operation does not silently consume reserves required for a mandatory end-of-life action.

P.4(b) Disposal or retirement evidence shall be retained with configuration and uncertainty. Where direct observation is unavailable, the organization shall identify the inference method and limitations rather than claiming unobserved success as verified.

Source tables — complete field and decision payloads

Table P-1 — Space assurance evidence matrix

Source p. 78, 79 | Required structure when applicable

Topic	Required evidence and decision	Typical responsible role
Mission and responsibility	Mission concept, success criteria, system boundary, approval interfaces and responsibilities for launch, space, ground and disposal.	Program technical authority.
Requirements and interfaces	Allocated requirements, interface-control documents, timing, communication, power, mechanical and environmental compatibility.	Systems engineering.
Parts and materials	Approved parts/material list, source traceability, suitability evidence and mission- specific limitations.	Parts/materials assurance.
Radiation and charging	Relevant environment, susceptibility assessment, protection assumptions, verification and residual limitations.	Qualified environment specialist.
Thermal and vacuum	Model credibility, thermal cases, qualification/acceptance rationale and test- article representativeness.	Thermal and test authorities.
Mechanical environment	Launch/transport loads, vibration/shock basis, test configuration, margins and cumulative exposure.	Structures and test authorities.
Contamination	Particulate/molecular or biological controls as applicable, monitoring, integration discipline and excursions.	Contamination authority.
Software and command	Controlled flight/ground software, command authority, authentication, timing, recovery and anomaly response.	Software/security/operations authorities.
Energy and resources	Power/energy budgets, degradation, reserve definitions, safe modes and end-of-life resource needs.	Subsystem and mission authorities.
Reliability and hazards	Failure analysis, common causes, inaccessible repairs, redundant-function assumptions and independent safety argument.	Reliability and safety authorities.
Ground and operations	Ground baseline, telemetry interpretation, rehearsals, staffing, handovers, outages and emergency procedures.	Operations authority.
Tracking and disposal	Assigned coordination duties, disposal concept, failure cases, remaining-resource checks and verified disposition.	Mission operations and compliance.
Human systems	Life-support interfaces, habitability, workload, emergencies and required independent review for human exposure.	Human-systems and safety authorities.
Surface mobility	Terrain/environment basis, dust/thermal effects, autonomous limits, communications delay, energy and recovery.	Surface-system technical authority.
In-space servicing/manufacture	Remote inspection credibility, material/process qualification, capture/interface risks and safe abort.	Servicing/manufacturing authority.
Long-life knowledge	Readable technical records, command history, software reconstruction, supplier exit and continuing support.	Configuration and support authorities.

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.