



# AF 9100:2026

## Aerospace Quality Management System

CHECKLIST

### **Software, AI and Digital Engineering — Checklist**

**AF-CL-9100-003**

FIRST EDITION

30 September 2026 | English master text

# Publication identity and application

| Control                    | Publication value                                                                                                            |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Title                      | Software, AI and Digital Engineering — Checklist                                                                             |
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| Responsible owner function | Technical evaluator                                                                                                          |
| Primary source anchors     | 12                                                                                                                           |
| Delivery status            | Prepared implementation companion. Actual approval, adoption, effectivity and operational decisions are recorded separately. |

## 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.

Interactive fields are blank by default. Save a working copy, use continuation records where necessary and preserve raw supporting evidence outside the PDF through controlled references. Separate issued PDFs are the authoritative interactive copies; the combined reading edition is flattened.

# Contents and reading route

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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 Checklist use and state definitions

Evaluate the whole source condition, including every joined sub-condition. Where different parts have different evidence, add separate continuation rows linked to the original identifier. Do not compress a compound requirement into a favorable summary.

| Field state | Meaning                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------|
| PASS        | Conforming: valid evidence meets the approved applicable condition.                                                                    |
| FAIL        | Nonconforming: valid evidence demonstrates failure of the applicable requirement.                                                      |
| HOLD        | Not yet demonstrated: applicability, criteria, evidence, validity, interpretation or authority remains unresolved.                     |
| N/A         | Not applicable only with an approved absence-of-activity-and-responsibility rationale. Missing resources or access are not exclusions. |

States in this companion map to the source’s requirement-status dictionary; operational record status and evidence validity remain separate. No prefilled state is supplied. A metric counts progress only and cannot override a mandatory failure.

**Assessment / case / object / profile / evaluated version**

**Assessor / actual dates / route / sites / configuration / selected scope**

**Approved applicability and exclusions / continuation record location**

## 2 Complete source-condition evaluation

### 12.1 — Digital lifecycle and architectural assurance

#### 12.1(a) | Source p. 29

The organization shall establish a lifecycle for software and programmable hardware covering requirements, architecture, implementation, integration, verification, release, maintenance and retirement. Safety and mission allocations shall be reflected in architecture and verification independence.

Digital lifecycle plan; allocated requirements; architecture; fault-containment and timing analyses.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

#### 12.1(b) | Source p. 29

The architecture shall address partitioning, timing, resource exhaustion, fault containment, recovery and interfaces. An assumption that software does not wear out shall not be used to dismiss systematic defects, data corruption, configuration errors or changes in the environment.

Digital lifecycle plan; allocated requirements; architecture; fault-containment and timing analyses.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

### 12.2 — Implementation, review and build control

#### 12.2(a) | Source p. 29

Source code, programmable logic, generated code and build definitions shall be version controlled with attributable changes. Review and analysis shall be suitable for the language, platform and criticality. Coding or modeling constraints shall be justified and enforced by competent review and appropriate tools.

Source and review records; build manifest; dependency inventory; reproducibility and artifact identity checks.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

#### 12.2(b) | Source p. 29

Builds shall identify source revisions, dependencies, toolchain versions, compiler settings, configuration and resulting artifact hashes. Reproducibility shall be demonstrated where necessary to establish that the released binary corresponds to reviewed sources. Secrets and unapproved dependencies shall not be embedded in released artifacts.

Source and review records; build manifest; dependency inventory; reproducibility and artifact identity checks.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

## 12.3 — Verification, test coverage and independence

### 12.3(a) | Source p. 29

Digital verification shall address requirements, interfaces, boundary values, abnormal inputs, timing, failure handling and regression. Structural or functional coverage criteria shall be chosen based on the assurance rationale and applicable domain obligations, not on a universal percentage in this standard.

Verification plan; traceable tests; coverage analysis; anomaly disposition; target-representativeness assessment.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

### 12.3(b) | Source p. 29

Test results shall identify the target environment and configuration. Differences between simulation, host execution and deployed hardware shall be assessed. Uncovered behavior, unresolved anomalies and tool limitations shall be evaluated explicitly before release.

Verification plan; traceable tests; coverage analysis; anomaly disposition; target-representativeness assessment.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

## 12.4 — AI and machine-learning use-case governance

### 12.4(a) | Source p. 30

Every AI use case affecting assured outcomes shall have an accountable owner, intended use, prohibited use, operational domain, performance criteria, hazard assessment and monitoring plan. The organization shall assess whether AI is necessary and whether simpler, more verifiable alternatives meet the need.

AI use-case inventory; intended-use statement; alternatives assessment; authority limits; oversight validation.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

### 12.4(b) | Source p. 30

Authority granted to the model shall be bounded. Human oversight shall be designed so that the responsible person has adequate information, time and ability to intervene. A nominal human approval step shall not be treated as effective control when the person cannot meaningfully review the output.

AI use-case inventory; intended-use statement; alternatives assessment; authority limits; oversight validation.

**STATE**

**EVIDENCE / APPROVED N/A BASIS**

**REVIEWER / ACTUAL EVENT**




Gap / required action / continuation record:

## 12.5 — Dataset quality, lineage and evaluation design

### 12.5(a) | Source p. 30

Datasets shall have documented provenance, rights, collection methods, labeling procedures, relevant populations, environmental coverage and known limitations. Training, tuning and evaluation partitions shall be controlled to prevent leakage or unjustified overlap.

Dataset manifest; labeling assurance; partition controls; scenario coverage; stratified evaluation and uncertainty.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

### 12.5(b) | Source p. 30

Evaluation shall include relevant rare conditions, degraded sensors, out-of-domain inputs and important subgroups. Performance shall be reported with denominators, uncertainty and failure analysis. Aggregate accuracy shall not conceal unacceptable failure in a critical operating condition. Annex N specifies a minimum model and dataset evidence card.

Dataset manifest; labeling assurance; partition controls; scenario coverage; stratified evaluation and uncertainty.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

## 12.6 — Model release, drift and bounded adaptation

### 12.6(a) | Source p. 30

Model weights, preprocessing, inference configuration, dependencies and decision thresholds shall be controlled as a single released configuration. The organization shall demonstrate safe behavior for invalid, missing, adversarial or out-of-distribution inputs within the defined threat and hazard model.

Model release card; drift thresholds and rationale; fallback tests; update approvals; monitoring records.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

### 12.6(b) | Source p. 30

Post-release monitoring shall detect relevant drift, performance degradation and unexpected behavior. Online learning or autonomous adaptation shall not change safety-relevant behavior outside an approved envelope. Material changes shall undergo a new impact assessment, verification and authorized release.

Model release card; drift thresholds and rationale; fallback tests; update approvals; monitoring records.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

### 12.6(c) | Source p. 30

Fallback and rollback shall be technically feasible and tested. A model shall not be retained merely because replacing it would disrupt operations when its approved performance basis is no longer valid.

Model release card; drift thresholds and rationale; fallback tests; update approvals; monitoring records.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

## 12.7 — Generative AI and engineering evidence

### 12.7(a) | Source p. 30

Generative AI used in engineering, procurement, inspection, coding or technical documentation shall have controlled inputs, access and review requirements. Generated claims, citations, calculations and design details shall be verified by competent personnel before becoming controlled evidence.

Approved use cases; data-access rules; review records; verified calculations and references.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

### 12.7(b) | Source p. 30

The organization shall prevent unauthorized disclosure of proprietary or controlled technical data to external services. Prompt history or a generated explanation shall not substitute for a validated calculation, traceable test or approved design rationale. The human or organizational approval responsibility shall remain identifiable.

Approved use cases; data-access rules; review records; verified calculations and references.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

## 12.8 — Digital twins, MBSE and model-based acceptance

### 12.8(a) | Source p. 30

Model-based engineering artifacts shall have defined authority, scope, interfaces, configuration and exchange rules. A digital twin shall state its decision purpose, physical association, update mechanism and validated domain. Synchronization errors and stale data shall be detectable.

Model authority map; twin identity and update controls; validation; model-based acceptance rationale.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

**12.8(b) | Source p. 30**

When a model replaces or reduces physical testing, the organization shall provide a documented equivalence argument, uncertainty assessment, validation evidence and required independent approval. Model convenience shall not be sufficient justification for removing a test.

Model authority map; twin identity and update controls; validation; model-based acceptance rationale.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

## 12.9 — Long-term digital maintainability and obsolescence

**12.9(a) | Source p. 30**

The organization shall plan preservation of source, build environments, licenses, tools and technical knowledge needed to maintain or reconstruct long-life digital products. Dependence on a discontinued cloud service or supplier shall be assessed before release.

Digital support plan; escrow or access arrangements where needed; migration tests; obsolescence decisions.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
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Gap / required action / continuation record:

**12.9(b) | Source p. 30**

Obsolescence plans shall address migration, emulation, replacement, security support and requalification. A digitally signed record shall remain interpretable after algorithm or certificate changes through an approved preservation strategy; cryptographic signing alone shall not guarantee permanent readability.

Digital support plan; escrow or access arrangements where needed; migration tests; obsolescence decisions.

| STATE                | EVIDENCE / APPROVED N/A BASIS | REVIEWER / ACTUAL EVENT |
|----------------------|-------------------------------|-------------------------|
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Gap / required action / continuation record:

## 4 Compound-condition continuation and final reconciliation

Duplicate these controlled continuation fields as needed. Each additional predicate retains its parent source identifier, object, criterion, evidence, actual result, gap and independent approval. The number of printed fields is not a limit on the required evidence.

**Parent requirement / compound condition / applicable object**

**Separate criterion and approved technical basis**

**Method, actual configuration and original evidence**

**Result, uncertainty/rubric and PASS/FAIL/HOLD/N/A reason**

**Failed/held condition, owner, original due event and action**

**Approved exclusion and independent review reference**

**Final requirement population and unresolved conditions**

**Independent reviewer / decision authority / genuine approval reference**

Initial grant, renewal and extension require closure of all in-scope nonconformities and the source's complete decision conditions. A separate authorized technical concession does not make a failed original criterion conforming. Preserve independent review, actual authority and precise scope.