



ASTRA

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Purpose and application

Method/range/site scope, responsible technical roles, measurement suitability, method validation, witness trails, nonconforming work and bounded reporting.

Source requirements and added implementation detail

The controlling ASTRA source is identified above by content fingerprint. Numbered source clauses and annexes retain their own authority. The retained operating material is restructured and expanded with implementation methods, additional profile controls, worked synthetic examples, decision diagrams and record contracts. Added implementation detail is not presented as an earlier institutional approval or as a change to the supplied core standard. Any additional binding criterion requires the applicable technical adoption process.

The displayed publication date identifies the edition; it is not a fabricated authoring, test, approval or operational date. Actual records retain genuine event times and controlled versions. No named outside organisation or standard is incorporated as a normative reference. AF internal instruments and separate legal or contractual duties remain applicable within their actual scope.

Acceptance boundary

A positive grant requires every applicable mandatory condition to PASS, every N/A to have independent justification, every in-scope nonconformity to be verified closed, and competent independent authority. HOLD, unknown state, missing evidence, a favourable average, a signature image or a completed form cannot substitute for those conditions.

Contents

Publication identity and use	2
Purpose and application	2
Source requirements and added implementation detail	2
Contents	3
1 Reader, scope and first decisions	6
2 Implementation sequence	6
Scope Definition, Applicability and Evidence Reuse	6
Assessment Planning, Resources and Site Coverage	6
Technical Witnessing and Method-Family Coverage	7
Measurement Traceability, Uncertainty and Decision Rules	7
Continuing Validity, Comparisons and Proficiency Activities	7
Technical Reporting, Amendments and Report Review	8
Nonconformity, Containment and Corrective Action	8
3 Detailed application boundaries	9
F03-L01 — Non-destructive testing	9
F03-L02 — Materials testing	9
F03-L03 — Calibration and metrology	9
F03-L04 — Inspection body activities	9
F03-L05 — Management-system certification bodies	10
F03-L06 — Product, process and service certification bodies	10
F03-L07 — Personnel certification bodies	10
F03-L08 — Validation and verification bodies	10
F03-L09 — Proficiency activity providers	11
F03-L10 — Reference material producers	11
Worked cases and challenge questions	11
Synthetic case — Scope Definition, Applicability and Evidence Reuse	11

Synthetic case — Technical Witnessing and Method-Family Coverage	11
Synthetic case — Continuing Validity, Comparisons and Proficiency Activities	11
4 Self-check before submission	12
Decision and authority boundary	12
E1 Explicit acceptance and evidence contract	13
E2 Source-to-implementation crosswalk	13
E3 Detailed operating extensions	17
AF-AST-PR-004 — Scope Definition, Applicability and Evidence Reuse	17
AF-AST-PR-005 — Personnel Qualification, Authorisation and Monitoring	18
AF-AST-PR-009 — Technical Witnessing and Method-Family Coverage	18
AF-AST-PR-010 — Measurement Traceability, Uncertainty and Decision Rules	19
AF-AST-PR-011 — Continuing Validity, Comparisons and Proficiency Activities	19
AF-AST-PR-012 — Technical Reporting, Amendments and Report Review	20
AF-AST-PR-013 — Nonconformity, Containment and Corrective Action	20
E4 Application-specific parameter completion	21
P01 — Mission and scope	21
P02 — Environment and exposure	21
P03 — Requirements and acceptance	21
P04 — Geometry and reference systems	21
P05 — Materials and process qualification	21
P06 — Test article and fixtures	22
P07 — Measurement and uncertainty	22
P08 — Structure, life and mechanisms	22
P10 — Thermal and environmental control	22
P11 — Communication and timing	22
P12 — Human and protective response	22
P13 — Contamination and samples	22
P14 — Software, AI and models	22

P16 — Reliability and availability	23
P18 — Decision, continuity and terminal duties	23
E5 All-space applicability and bounded responsibility	23
E6 Workflow and evidence relationships	25
E7 Calculations, assumptions and synthetic charts	26
AM.Q01 Measurement uncertainty and covariance	26
AM.Q02 Inclusive limits and four distinct measurement outcomes	27
AM.Q03 Positive-decision conjunction and essential failure	28
AM.Q04 Committee arithmetic and accreditation panels	29
AM.Q05 Productive evaluation time without double counting	30
AM.Q06 Random detection sample size	31
AM.Q07 Zero observed failures and an exact binomial bound	32
AM.Q08 No failures during exposure: exponential bound	33
AM.Q09 Availability is not output correctness	34
AM.Q17 Clock uncertainty and maximum data age	35
AM.Q18 Structural margin with explicitly assigned factors	36
AM.Q19 Vibration spectral integration and units	37
AM.Q23 Material genealogy, yield and retained work	38
E8 Adverse cases and independent replay	40
Appendix A — Controlling source requirements	42
Appendix B — Local adoption, validation and receiving acceptance	58

1 Reader, scope and first decisions

For: Laboratory, calibration and inspection applicants and assessors.

Method/range/site scope, responsible technical roles, measurement suitability, method validation, witness trails, nonconforming work and bounded reporting.

Start with the actual requested conclusion and the current adopted profile. Identify which information is source evidence, what is only proposed, who performs the activity and which independent function may decide. A guide explains implementation; it does not add a hidden pass threshold or substitute for the full standard.

2 Implementation sequence

Scope Definition, Applicability and Evidence Reuse

All case tuples, activity-based applicability, local/remote interfaces and reliance on prior results. This procedure controls the meaning of the claim before planning time or issuing a certificate.

Map retained responsibility

Identify the legal entity, sites, external performers, design/acceptance authority and lifecycle duties. Outsourcing changes the performer but does not necessarily remove the applicant duty. Distinguish headquarters governance from local implementation and direct service performance from coordination.

Examine reused evidence

Verify the original issuer, source, method, configuration, conditions, date and accessible limitations. Identify precisely which characteristics or requirements remain unchanged. Preserve failures and restrictions. A common owner or identical document title does not establish site equivalence.

Carry scope through every record

Check the same tuple in the plan, observations, reports, findings, review, decision, certificate instruction and public record. When the scope changes, preserve the earlier request and assessment history. Do not silently remove a failed activity merely to present the remaining work as an unrestricted success.

Common error / hold: Unclear outcome class, missing configuration, unsupported exclusion or inaccessible essential reused evidence holds the dependent conclusion until an independently reviewable boundary exists.

Assessment Planning, Resources and Site Coverage

Planning by object, sites, methods, shifts, actual performers, conditions and consequence. Organisational AF 9100 time rules are not transplanted into laboratory witnesses or personnel examinations.

Plan local evidence

For initial and renewal operational-capability or CAB work, establish direct evidence at every included delivery location. Shared governance does not establish local capability. Use physical visits where necessary work cannot be established remotely. Apply eligible surveillance sampling only through a justified approved profile.

Calculate real evaluation resources

For non-organisational work, sum justified productive task hours and divide by eight. Count genuinely shared work once. Allocate travel, breaks, reporting, translation delay and independent review/panel work separately. Apply the complete AF 9100 model only for its organisational route and add necessary coverage.

Reconcile actual execution

Record actual participants, productive hours, observations, interruptions and deviations. Add work when essential coverage is missing, or hold/narrow the conclusion through an actual reviewed boundary. Report completed coverage rather than copying the original plan as though every planned action occurred.

Common error / hold: Missing site evidence, unjustified method grouping, unavailable specialist competence, unsafe access or inadequate time requires additional work, a supported restriction or deferral.

Technical Witnessing and Method-Family Coverage

Witnessing of manufacturing, testing, inspection, maintenance, services, education or statement activities within an approved profile and safe access boundary.

Confirm readiness and authority

Verify actual performer, task authorisation, method, article configuration, equipment, software and environmental conditions. Confirm safe access and the responsible stop authority. An assessor observes competence and does not take operational command of hazardous work.

Trace forward to release

Follow the observation into raw data, calculation, report review, technical disposition and actual authorised release. Check whether the conclusion matches the evaluated item and whether recipients received required restrictions. Separate process qualification, product acceptance and provider competence.

Hand over for independent review

Provide an attributable witness record with sources, actual observations, findings and precise conclusion. Identify any supplementary work still required. The witness recommendation is evaluation evidence, not the independent final conformity decision.

Common error / hold: An unobserved essential step, inappropriate method, invalid equipment or unsupported representative grouping requires additional demonstration or an explicitly restricted conclusion.

Measurement Traceability, Uncertainty and Decision Rules

Measurands, references, corrections, uncertainty and decision rules used in every relevant family. Measurement confidence, detection performance and administrative completion percentages are not interchangeable.

Verify the measurement chain

Check instrument suitability, range, resolution, reference basis, calibration result and actual status at the time of use. Review uncertainty and conditions of external calibration, not merely a logo. Document justified alternative reference bases where direct reference traceability is not technically possible.

Approve the decision rule prospectively

Agree uncertainty treatment and false-acceptance/false-rejection considerations before results are evaluated. Apply the full-interval rule when required by Annex G, or obtain the specified independent prospective approval for an alternative. An alternative cannot be selected after seeing a borderline result.

Review and communicate the bounded result

An authorised technical reviewer checks model relevance, arithmetic, actual inputs and the intended claim. Report corrections, uncertainty and coverage where needed, the decision rule, result and limitations. An adverse instrument finding triggers prior-result review and recipient correction, not only recalibration.

Common error / hold: Invalid calibration, an incomplete uncertainty model, an unapproved retrospective rule or an indeterminate essential characteristic blocks acceptance for the dependent claim.

Continuing Validity, Comparisons and Proficiency Activities

Internal checks, independent comparisons, proficiency activity and technically justified alternatives for significant testing, calibration, inspection or statement fields.

Select suitable challenges

Plan reference checks, blind/duplicate work, retained specimens, independent comparisons or proficiency activities suited to the actual decision. Consider material, geometry, range, uncertainty and consequence. Define what a satisfactory outcome means before results are received.

Evaluate results and coverage

Review performance against the pre-established basis and uncertainty. Examine patterns across methods, sites and operators. A satisfactory result for one easy material or range does not automatically cover all technical activity. Maintain a gap map for unchallenged capabilities.

Verify restoration and maintain the plan

Demonstrate corrective effectiveness through relevant repeat or independent evidence before restoring the affected capability. Update the field coverage after scope changes, low activity, new software or relocated equipment. Carry conclusions into surveillance and signatory authorisation.

Common error / hold: Unresolved adverse comparison evidence, an unsuitable assigned value or unchallenged essential field prevents a positive competence conclusion for that scope.

Technical Reporting, Amendments and Report Review

Laboratory, inspection, assessment, educational, operational and environmental reports, with the distinctions required by their actual result class.

Reconcile original evidence

Link observations, input identities, raw data, processing, corrections, measurement status and conditions to the same evaluated object. Keep customer-supplied descriptions, subcontracted results and expert opinions distinguishable from the issuer observations.

Perform competent technical review

The authorised reviewer checks the result against the applicable criteria, source evidence, method scope and permitted wording. Resolve contradictions or return the report for correction. Technical sign-off and an independent conformity decision remain separate where the route requires both.

Notify and retain usable history

Reach recipients who relied on an incorrect result, provide the corrected bounded conclusion and record acknowledgement where needed. Preserve originals, supersession and current status. An amended PDF must remain linked to raw evidence and any continuing restriction.

Common error / hold: An unsupported claim, unresolved essential evidence gap, invalid method or absent authorised signatory holds report release; an already issued unsupported conclusion triggers correction and recipient action.

Nonconformity, Containment and Corrective Action

All technical and administrative findings, with separate immediate protection, corrective action, independent status decisions and historical-output review.

Protect immediately

Responsible operations protect people and affected work upon a credible serious concern, preserve evidence and notify required parties. Holder critical notice is within 24 hours of awareness; operator action on a substantiated critical concern is within 24 hours. Earlier applicable duties remain. Grading debate must not delay protection.

Agree a dated action plan

Submit the plan within 30 calendar days of the original finding notification. Name owners, technical changes, protective measures, verification methods and effectiveness exposure. Set major closure at 60 days and minor closure at 90 days from the original notice, subject to earlier duties.

Close, reopen and learn

Record actual effectiveness evidence, closure authority and communications. Missed deadlines trigger the applicable status action, not automatic extension. Recurrence reopens cause and extent analysis. Preserve the original dates and earlier failed conclusions during reissue, reassignment and improvement.

Common error / hold: Uncontrolled critical concern, unverified effectiveness, missed required closure or open in-scope nonconformity blocks the relevant grant and triggers proportionate continuing-status protection.

3 Detailed application boundaries

F03-L01 – Non-destructive testing

Competence to perform defined non-destructive evaluation techniques for stated material/product sectors, geometries, defect mechanisms and access conditions. Technique-specific methods may include visual/optical, penetrant, magnetic, ultrasonic, radiographic, electromagnetic or other justified approaches; none is granted merely by this catalogue.

Application-specific parameters: Technique and method version; material/geometry; target defect mechanism; range and access; equipment/software; reference items; personnel/task authority; detection limits; acceptance criteria; actual site/mobile use.

Representative witnessing: Witness each technically distinct technique family from preparation to report, including representative difficult boundaries and an adverse or ambiguous indication.

Change / requalification triggers: Technique/principle; equipment/software; personnel; reference item; geometry/material; acceptance method; location/access; automated interpretation.

Result boundary: Accreditation concerns the declared body competence; neither a test report nor a personnel credential automatically certifies the inspected product.

F03-L02 – Materials testing

Competence for specified mechanical, physical, chemical, thermal and other material-characterisation methods on defined samples and parent populations. Include specimen preparation, orientation, conditioning, instrument control, data treatment and bounded interpretation.

Application-specific parameters: Property/measurand; material/matrix; parent and specimen identity; geometry/orientation; conditioning; equipment/rate/control; range; calibration/reference; data processing; uncertainty; sampling responsibility.

Representative witnessing: Follow one specimen from parent selection and custody through preparation, actual execution, raw data, processing and report; review an invalid-test/retest decision.

Change / requalification triggers: Material/matrix; specimen geometry; preparation; equipment/software; control rate/range; reference method; site; intended inference.

Result boundary: Test competence and sample results do not imply conformity of an unrepresented lot, product family or future production.

F03-L03 – Calibration and metrology

Competence to establish and report defined measurement quantities, ranges and uncertainties under specified laboratory, on-site or mobile conditions. Scope capability and individual calibration results remain distinguishable.

Application-specific parameters: Quantity/measurand; range; method; reference chain; environmental conditions; correction model; uncertainty contributions and coverage; device/configuration; laboratory/mobile site; signatory.

Representative witnessing: Witness representative range and method families, inspect reference/correction evidence and reconstruct a complete uncertainty-to-certificate trail including a failed check.

Change / requalification triggers: Quantity/range; reference standard; method; environment; equipment/software; uncertainty model; mobile location; authorised signatory.

Result boundary: A calibration capability is not product conformity or assurance that every later user measurement is suitable for its decision.

F03-L04 – Inspection body activities

Competence to inspect defined products, installations, processes or services at stated lifecycle stages. The declared independence relationship may be third-party or an explicitly identified internal/related relationship; wording must match the actual arrangement.

Application-specific parameters: Object and lifecycle stage; inspection criteria; independence relationship; methods; sample/access; instruments; personnel judgement; location; reporting; detection and scope limitations.

Representative witnessing: Trace an actual inspection from request and relationship declaration through observation, interpretation and report, including an inaccessible feature and an adverse finding.

Change / requalification triggers: Inspection object/stage; independence model; technique; personnel; equipment; remote method; sampling; site; acceptance criteria.

Result boundary: An inspection competence result does not certify every inspected item or convert internal inspection into third-party certification.

F03-L05 – Management-system certification bodies

Competence and impartial operation of a body providing management-system certification for specified schemes, sectors, organisational scopes and consequence levels. The full application-to-decision cycle is within scope, not just audit delivery.

Application-specific parameters: Scheme/profile and version; sector; organisational/site boundaries; audit and specialist competence; readiness/implementation methods; time/site rules; independent decision; surveillance; public claims.

Representative witnessing: Review complete accepted and refused certification cases, witness representative audits and examine independent decision, surveillance and appeal records.

Change / requalification triggers: New scheme/sector; technical or criticality scope; decision outsourcing; personnel; time/site model; digital audit platform; ownership.

Result boundary: Accreditation of the body does not certify the body own consultancy work or establish conformity of every client without a separate case decision.

F03-L06 – Product, process and service certification bodies

Bodies evaluating and certifying defined products, processes or services through instance or ongoing conformity models. Specify technical evaluation capability, production/service controls, sampling, independent decisions and continuing claim rules.

Application-specific parameters: Object family; intended use; instance/ongoing model; criteria and methods; sampling; technical experts; outsourced laboratories; production/delivery controls; surveillance; labels; decision authority.

Representative witnessing: Witness a representative technical evaluation and trace its sample/configuration through external evidence, independent review, certificate scope and continuing controls.

Change / requalification triggers: Object family; conformity model; criterion/method; lab/provider; production site; critical software; label or surveillance method.

Result boundary: Body accreditation is not blanket product approval; one instance test cannot authorise indefinite family production.

F03-L07 – Personnel certification bodies

Bodies independently assessing competence against defined jobs, roles, levels and practical tasks. Learning provision, secure examination, certification, employer task authorisation and occupational licensing remain distinct.

Application-specific parameters: Job/task profile; level and prerequisites; knowledge/practical blueprint; essential steps; evaluator competence; exam security; independence; credential limits; maintained practice; renewal and remedies.

Representative witnessing: Review task analysis, observe practical assessment and trace a candidate attempt through independent decision, credential scope, currency and a failed/reassessment case.

Change / requalification triggers: Role/level; task blueprint; practical method; scoring; essential steps; delivery mode; assessor; renewal rules; generated assessment content.

Result boundary: A personnel credential does not itself authorise aircraft release, restricted testing or every task performed by the employer.

F03-L08 – Validation and verification bodies

Bodies evaluating specified historical or prospective claims for defined sectors, methods, data and assurance forms. Statement preparation and independent evaluation of the same statement must be separated.

Application-specific parameters: Statement type; sector; boundary/period; methodology; intended users; assurance form; materiality; strategic risk; evidence access; technical reviewers; independent conclusion; later correction.

Representative witnessing: Trace a complete engagement from acceptance through strategy, actual testing, misstatement resolution, independent conclusion and subsequent correction handling.

Change / requalification triggers: Claim type/sector; methodology; assurance form; data source; materiality method; personnel; digital tools; geographic/period boundary.

Result boundary: Accreditation concerns body competence and is not endorsement of every future statement it issues.

F03-L09 – Proficiency activity providers

Providers designing and administering competence-comparison exercises for specified methods, materials and participant populations. A laboratory accreditation does not automatically confer this specialised capability.

Application-specific parameters: Exercise purpose; technical field; participants; item design; assigned-value basis; homogeneity/stability; uncertainty; statistical evaluation; confidentiality; reporting; appeals and corrections.

Representative witnessing: Reconstruct an exercise from planning and item evidence to assigned values, received data, calculations, reports and one adverse or corrected outcome.

Change / requalification triggers: Item/material; technical field; assigned-value method; statistical model; software; participant population; distribution/storage conditions.

Result boundary: No universal proficiency score or assigned-value recipe is supplied; the technical profile must justify them for the actual exercise.

F03-L10 – Reference material producers

Producers of reference materials for specified properties and intended uses, including production control, characterisation, homogeneity, stability, uncertainty, documentation and distribution.

Application-specific parameters: Material/matrix; property; intended use; production lot; characterisation design; reference basis; homogeneity/stability; uncertainty; packaging/storage; certificate/statement; monitoring.

Representative witnessing: Trace one reference-material lot through source, production, homogeneity/stability, characterisation, uncertainty, issue and monitoring.

Change / requalification triggers: Matrix/property; production method; contributing laboratories; characterisation model; packaging; storage; stability or uncertainty basis.

Result boundary: A nominal value with unknown provenance cannot support metrological traceability or a broader property claim.

Worked cases and challenge questions

Synthetic case – Scope Definition, Applicability and Evidence Reuse

A synthetic component has bench evidence but a new installation changes power and cooling. The unchanged material evidence is reused; installation compatibility remains open and requires new verification. The component result does not become an installed-system result.

Review challenge: identify the exact affected object, requirement, missing or adverse evidence, accountable action, independent decision and historical record. A fictional example is not a real applicant or evidence of a completed pilot.

Synthetic case – Technical Witnessing and Method-Family Coverage

A synthetic laboratory demonstrates one technique on an accessible reference item. The requested scope includes a different geometry with restricted access. The witness supports the first boundary only; separate technical evidence is required for the second.

Review challenge: identify the exact affected object, requirement, missing or adverse evidence, accountable action, independent decision and historical record. A fictional example is not a real applicant or evidence of a completed pilot.

Synthetic case – Continuing Validity, Comparisons and Proficiency Activities

A synthetic laboratory is enrolled in a comparison but has no completed result. The enrolment is recorded as planned evidence, not satisfactory performance. Initial scope review awaits a valid result or an independently accepted technically suitable alternative.

Review challenge: identify the exact affected object, requirement, missing or adverse evidence, accountable action, independent decision and historical record. A fictional example is not a real applicant or evidence of a completed pilot.

4 Self-check before submission

Can the reviewer identify the exact object, current criteria, actual performer, representative evidence, adverse results, remaining uncertainty and real authority without inferring them from a title? Check local sites and dependent services separately. Keep blanks and unknowns visible and provide controlled continuations for long source material.

Decision and authority boundary

A positive grant, renewal or extension requires valid scope, every applicable criterion fulfilled, sufficient usable evidence, closure of every in-scope nonconformity, current competent independent decision authority and effective required permissions. No score, majority vote, membership status or future corrective promise replaces a missing gate. An operational technical release, a programme outcome and an administrative publication are separate actions.

E1 Explicit acceptance and evidence contract

Apply the following logic to the exact evaluated object and responsible function. A procedural checkpoint, product characteristic, competence decision and public credential are different objects. Their states shall not be collapsed into one score. Source: ASTRA 62.1–62.7 and Annex AL.

State	Sufficient basis	Required next action
PASS	Applicable; current approved predicate met by valid, purpose-specific evidence.	Retain the original evidence and bounded inference. Other mandatory gates still apply.
FAIL	Applicable; valid evidence demonstrates that the approved predicate is not met.	Contain affected use; retain the failure; assess cause, extent and required corrective verification.
HOLD	Applicability, criterion, method, evidence, uncertainty or authority is unresolved.	Resolve the missing basis. Do not manufacture a value, favourable default or product-defect conclusion.
N/A	Activity trigger and retained responsibility are absent; independent exclusion approval exists.	Retain the scope-specific reason and reassess when activity or responsibility changes.
UNSET	Only an uncompleted field in this PDF; not a conformity state.	No conclusion is recorded. Complete review before the field can support a decision.

For a compound source clause, create a child-condition ledger containing every separately testable condition, location, phase and operating mode. A sentence-level checkpoint is a navigation aid, not permission to merge unrelated predicates. Each child receives an ID, responsible owner, criterion, method, source evidence, uncertainty where relevant, current state and independent review. The parent cannot PASS while any mandatory child is FAIL, HOLD or UNSET.

An acceptable measurement interval and an acceptable authority chain are independent prerequisites. Use finite, unit-consistent, unrounded values; negative uncertainty, reversed limits, unknown version or wrong-object evidence produce HOLD. For inclusive [L,H] and accepted interval [a,b], PASS requires $a \geq L$ and $b \leq H$; FAIL requires $b < L$ or $a > H$; otherwise HOLD. Approved one-sided or exclusive boundaries retain their own declared predicate.

Positive-decision conjunction

Every applicable mandatory child is PASS AND each N/A is independently justified AND every in-scope nonconformity is verified closed AND scope, competence, independence and actual authority are valid AND required panel participation and voting rules are satisfied. No average, majority preference or payment supplies missing evidence.

E2 Source-to-implementation crosswalk

The references below use the supplied 248-page FIRST EDITION. Each row retains the original clause identifier and source page. The operating instructions in this document elaborate implementation; they do not replace the full source condition or its applicable annexes. A reference to a whole chapter requires selection of every triggered subclause, not only the examples printed here.

ASTRA ID / page	Source subject	Implementation use
1.3 / 10	Object and responsibility tuple	Requirement, objective evidence and local child predicates
1.5 / 11	Activity-based applicability	Requirement, objective evidence and local child predicates
7.1 / 17	Function-specific competence	Requirement, objective evidence and local child predicates
7.3 / 17	Essential steps and assessment security	Requirement, objective evidence and local child predicates

ASTRA ID / page	Source subject	Implementation use
7.4 / 17	Initial assessor population	Requirement, objective evidence and local child predicates
7.5 / 18	Maintenance and inactivity	Requirement, objective evidence and local child predicates
8.1 / 18	Facility suitability and environmental control	Requirement, objective evidence and local child predicates
8.2 / 18	Equipment identity and fitness	Requirement, objective evidence and local child predicates
8.3 / 18	Traceability and calibration	Requirement, objective evidence and local child predicates
8.4 / 19	Intermediate checks and due dates	Requirement, objective evidence and local child predicates
8.5 / 19	Adverse equipment findings	Requirement, objective evidence and local child predicates
8.6 / 19	Consumables, materials and reference items	Requirement, objective evidence and local child predicates
9.1 / 19	Method selection and contract fit	Requirement, objective evidence and local child predicates
9.2 / 19	Verification and validation	Requirement, objective evidence and local child predicates
9.3 / 20	Sampling and specimen integrity	Requirement, objective evidence and local child predicates
9.4 / 20	Measurement model and uncertainty	Requirement, objective evidence and local child predicates
9.5 / 20	Decision rules and boundary results	Requirement, objective evidence and local child predicates
9.6 / 20	Continuing validity and comparisons	Requirement, objective evidence and local child predicates
9.7 / 20	Technical reporting and amendments	Requirement, objective evidence and local child predicates
11.3 / 22	Existing evidence and reuse	Requirement, objective evidence and local child predicates
12.3 / 23	Method-family witnessing	Requirement, objective evidence and local child predicates
13.3 / 25	Witness control	Requirement, objective evidence and local child predicates
13.5 / 25	Closing and report	Requirement, objective evidence and local child predicates
14.1 / 25	Finding formulation and classification	Requirement, objective evidence and local child predicates

ASTRA ID / page	Source subject	Implementation use
14.2 / 25	Immediate protection and notifications	Requirement, objective evidence and local child predicates
14.3 / 26	Occurrence, escape and systemic extent	Requirement, objective evidence and local child predicates
14.4 / 26	Plans, closure and effectiveness	Requirement, objective evidence and local child predicates
14.5 / 26	Existing status and new grants	Requirement, objective evidence and local child predicates
19.1 / 31	Detailed technical scope	Requirement, objective evidence and local child predicates
19.2 / 31	Responsible technical management	Requirement, objective evidence and local child predicates
19.3 / 32	Method performance and detection	Requirement, objective evidence and local child predicates
19.4 / 32	NDT-specific competence	Requirement, objective evidence and local child predicates
19.5 / 32	Materials and destructive testing	Requirement, objective evidence and local child predicates
19.6 / 32	Calibration and reference capability	Requirement, objective evidence and local child predicates
19.7 / 32	Sampling and customer-supplied items	Requirement, objective evidence and local child predicates
19.8 / 32	Inspection relationships	Requirement, objective evidence and local child predicates
19.9 / 33	Inspection judgement and remote methods	Requirement, objective evidence and local child predicates
19.10 / 33	Comparisons and validity programme	Requirement, objective evidence and local child predicates
19.11 / 33	Nonconforming laboratory or inspection work	Requirement, objective evidence and local child predicates
19.12 / 33	Technical witnessing for accreditation	Requirement, objective evidence and local child predicates
25.1 / 42	Activity-specific provider controls	Requirement, objective evidence and local child predicates
25.2 / 42	Management-system certification	Requirement, objective evidence and local child predicates
25.3 / 42	Product, process and service certification	Requirement, objective evidence and local child predicates
25.4 / 43	Personnel certification	Requirement, objective evidence and local child predicates

ASTRA ID / page	Source subject	Implementation use
25.5 / 43	Validation and verification bodies	Requirement, objective evidence and local child predicates
25.6 / 43	Proficiency and reference-material activities	Requirement, objective evidence and local child predicates
28.1 / 45	Mandatory scope content	Requirement, objective evidence and local child predicates
41.2 / 62	Integrated route and hidden characteristics	Requirement, objective evidence and local child predicates
42.1 / 63	Requirement-led test strategy	Requirement, objective evidence and local child predicates
42.2 / 64	Test tailoring and representativeness	Requirement, objective evidence and local child predicates
42.3 / 64	Combined environments and test sequence	Requirement, objective evidence and local child predicates
42.4 / 64	Data acquisition, uncertainty and protective limits	Requirement, objective evidence and local child predicates
42.5 / 64	Failure, retest and independent judgement	Requirement, objective evidence and local child predicates
42.6 / 64	Laboratories and complete reports	Requirement, objective evidence and local child predicates
54.4 / 79	Occurrence, escape and affected population	Requirement, objective evidence and local child predicates
57.1 / 81	Role-specific competence and scope	Requirement, objective evidence and local child predicates
57.3 / 82	Practical assessment and maintained practice	Requirement, objective evidence and local child predicates
62.1 / 88	Atomic requirement record	Explicit verification and acceptance predicate
62.2 / 88	Mandatory parameter completion	Explicit verification and acceptance predicate
62.3 / 88	Evidence validity before conformity	Explicit verification and acceptance predicate
62.4 / 88	Four requirement states	Explicit verification and acceptance predicate
62.5 / 89	No compensation or favourable default	Explicit verification and acceptance predicate
62.7 / 89	Decision replay and consistency	Explicit verification and acceptance predicate
63.1 / 90	Domain selection without geographic omission	Explicit verification and acceptance predicate
63.3 / 90	Environment, phase and mode matrix	Explicit verification and acceptance predicate
63.6 / 91	Interface and lifecycle closure	Explicit verification and acceptance predicate
64.2 / 92	Geometry, reference frames and event time	Explicit verification and acceptance predicate
64.5 / 92	Heritage and similarity	Explicit verification and acceptance predicate

ASTRA ID / page	Source subject	Implementation use
65.6 / 95	Payload function and scientific or service output	Explicit verification and acceptance predicate
67.3 / 98	Receipt, execution and completion	Explicit verification and acceptance predicate
73.1 / 110	Population, mission and human tasks	Explicit verification and acceptance predicate
73.5 / 111	Human factors and effective authority	Explicit verification and acceptance predicate
74.6 / 113	Anomalies, unknown state and release of information	Explicit verification and acceptance predicate
75.3 / 114	Essential variables and remote monitoring	Explicit verification and acceptance predicate
77.2 / 118	Campaign design and article pedigree	Explicit verification and acceptance predicate
77.3 / 118	Measurement and uncertainty readiness	Explicit verification and acceptance predicate
77.5 / 118	Original data and invalid tests	Explicit verification and acceptance predicate
77.6 / 119	Numerical and attribute acceptance	Explicit verification and acceptance predicate
77.7 / 119	Retest and corrective verification	Explicit verification and acceptance predicate
77.8 / 119	Independent campaign closure	Explicit verification and acceptance predicate
78.4 / 120	Human authority and consequential decisions	Explicit verification and acceptance predicate
79.4 / 122	Affected populations and historical decisions	Explicit verification and acceptance predicate
80.1 / 124	One complete application schedule	Explicit verification and acceptance predicate
80.2 / 124	Domain and verification completeness	Explicit verification and acceptance predicate
80.3 / 124	Competent independent closure	Explicit verification and acceptance predicate
80.4 / 124	Bounded claim and publication	Explicit verification and acceptance predicate

E3 Detailed operating extensions

AF-AST-PR-004 — Scope Definition, Applicability and Evidence Reuse

Implementation basis: 1.3 (p. 10); 1.5 (p. 11); 11.3 (p. 22); 62.1 (p. 88); 62.4 (p. 88); 63.1 (p. 90); 63.3 (p. 90); 63.6 (p. 91); 64.5 (p. 92); 80.1 (p. 124); 80.2 (p. 124)

X04.1 Resolve every applicable domain

Compare the mission concept with AK01-AK32 and the actual activity with F01-F08. Record each phase, mode, duration, interface and retained responsibility.

Completion / hold: Unknown applicability is HOLD; absent equipment or budget never establishes N/A.

X04.2 Establish a defensible similarity argument

Compare object identity, design, sources, environment, software, prior exposure and observability. Assign reused evidence to specific unchanged requirements only.

Completion / hold: Every material difference has accepted new evidence or an explicitly limited conclusion.

X04.3 Maintain separate outcome tuples

A combined case may share provenance and visits but keeps separate methods, criteria, sites, instances, reviewers and independent decisions.

Completion / hold: No shared dossier creates a blanket mission, tenant, supplier or fleet approval.

X04.4 Approve exclusion and re-open triggers

An independent technical reviewer checks the absent trigger and retained duty, names the supported excluded boundary and records conditions that would re-open it.

Completion / hold: Only independently justified exclusions receive N/A; an unexamined consequential interface remains HOLD.

Record contract: the actor records the input baseline, actual work, deviations, result and evidence link; the named receiving function acknowledges access and the permitted next action. A returned or incomplete handover retains the original event history. Use the associated FR modules and RG record links; no document or database field confers actual authority.

AF-AST-PR-005 – Personnel Qualification, Authorisation and Monitoring

Implementation basis: 7.1 (p. 17); 7.3 (p. 17); 7.4 (p. 17); 7.5 (p. 18); 57.1 (p. 81); 57.3 (p. 82); 62.5 (p. 89); 73.1 (p. 110); 73.5 (p. 111); 78.4 (p. 120); 80.3 (p. 124)

X05.1 Map competence to an actual task

Separate knowledge, specialist methods, practical evaluation, leadership, review, decision and appeal. Map mission-domain demands and evidence-access limits to each role.

Completion / hold: A general title or training course is not an authorisation for an unfamiliar task.

X05.2 Observe essential performance directly

Define task conditions, representative configuration, rubric, prohibited assistance and essential steps before the demonstration. Preserve failed attempts and material limits of simulation.

Completion / hold: Every essential step passes individually; component scores cannot compensate for essential failure.

X05.3 Test effective human authority

Confirm information, response time, skill and technical access needed for intervention or independent decisions, particularly with delayed mission data and AI support.

Completion / hold: A nominal human approval point fails when timely meaningful intervention is not feasible.

X05.4 Maintain event-time currency

Review actual practice, learning, witnessed work, changing methods, report quality and adverse feedback. Record suspension and supervised reactivation using genuine dates.

Completion / hold: Later authorisation cannot validate prior out-of-scope work; assess affected earlier outputs separately.

Record contract: the actor records the input baseline, actual work, deviations, result and evidence link; the named receiving function acknowledges access and the permitted next action. A returned or incomplete handover retains the original event history. Use the associated FR modules and RG record links; no document or database field confers actual authority.

AF-AST-PR-009 – Technical Witnessing and Method-Family Coverage

Implementation basis: 12.3 (p. 23); 13.3 (p. 25); 19.12 (p. 33); 41.2 (p. 62); 62.3 (p. 88); 64.5 (p. 92); 75.3 (p. 114); 77.2 (p. 118); 77.3 (p. 118); 77.7 (p. 119)

X09.1 Define the method family technically

Group only common principles, geometry/material ranges, equipment, competence and failure mechanisms. Identify unique or high-consequence boundaries that cannot be inferred.

Completion / hold: No unrelated technique is added because it shares a performer or report template.

X09.2 Observe the complete task

Follow identification, preparation, setup, essential execution, raw data, interpretation, reporting and independent release within safe authorised arrangements.

Completion / hold: A selected favourable demonstration cannot replace missing essential preparation or interpretation evidence.

X09.3 Challenge hidden and remote properties

State what is directly measured, validly inferred or unknown and test relevant difficult boundaries and false-negative mechanisms.

Completion / hold: Process telemetry or nominal equipment output cannot replace an unobservable required product property.

X09.4 Review change and corrective retest

After an interruption, source change or failed witness, preserve originals and define corrective demonstration including the original failed mechanism.

Completion / hold: A fresh favourable run does not validate earlier affected output or automatically extend method scope.

Record contract: the actor records the input baseline, actual work, deviations, result and evidence link; the named receiving function acknowledges access and the permitted next action. A returned or incomplete handover retains the original event history. Use the associated FR modules and RG record links; no document or database field confers actual authority.

AF-AST-PR-010 – Measurement Traceability, Uncertainty and Decision Rules

Implementation basis: 8.2 (p. 18); 8.3 (p. 18); 9.4 (p. 20); 9.5 (p. 20); 62.2 (p. 88); 62.3 (p. 88); 62.4 (p. 88); 62.7 (p. 89); 64.2 (p. 92); 77.3 (p. 118); 77.6 (p. 119)

X10.1 Freeze the quantitative contract

Define the measurand, model, corrected result, units, bounds, inclusivity, actual configuration, uncertainty interpretation and prospective predicate.

Completion / hold: Invalid or missing essential inputs remain HOLD; the assessor does not supply an undocumented limit.

X10.2 Propagate actual uncertainty and dependence

Retain source distributions, sensitivity coefficients, covariance and model discrepancy. Distinguish standard uncertainty, expanded coverage and unbounded knowledge gaps.

Completion / hold: A copied instrument capability or assumed independence cannot replace a use-specific uncertainty budget.

X10.3 Apply state logic without rounding bias

Evaluate the full interval or a prospectively approved alternative with unrounded finite inputs. Preserve PASS, FAIL, HOLD and approved N/A as separate states.

Completion / hold: Boundary overlap remains HOLD; invalid evidence is not converted into a proven product defect.

X10.4 Replay and report independently

Recompute a boundary case with the same frozen inputs, identify any different assumptions and record scope-limited reporting and recipient corrections.

Completion / hold: Unresolved replay disagreement blocks the dependent acceptance even where the nominal arithmetic appears plausible.

Record contract: the actor records the input baseline, actual work, deviations, result and evidence link; the named receiving function acknowledges access and the permitted next action. A returned or incomplete handover retains the original event history. Use the associated FR modules and RG record links; no document or database field confers actual authority.

AF-AST-PR-011 – Continuing Validity, Comparisons and Proficiency Activities

Implementation basis: 9.2 (p. 19); 9.6 (p. 20); 19.3 (p. 32); 19.10 (p. 33); 25.6 (p. 43); 62.3 (p. 88); 64.5 (p. 92); 77.2 (p. 118); 77.5 (p. 118); 77.7 (p. 119)

X11.1 Design a purposeful validity programme

Define the measurand or task, coverage, reference basis, participant independence, frequency rationale and adverse-performance response.

Completion / hold: Participation alone is not satisfactory performance or demonstrated detection capability.

X11.2 Separate assigned-value and participant uncertainty

Review preparation, homogeneity, stability, transport, characterisation and uncertainty before attributing differences to a participant.

Completion / hold: Unstable or non-representative challenge material cannot support an unqualified competence conclusion.

X11.3 Evaluate limited and adverse results

Preserve nonresponses, invalid runs, outliers and unrepresented fields. Where an external exercise is unavailable, document a technically equivalent challenge and limitations.

Completion / hold: A missing comparison is not an automatic pass; accepted alternatives must test the actual claimed ability.

X11.4 Close causes and historical extent

Test occurrence and escape causes, re-execute the original adverse mechanism and review outputs that depended on the deficient method.

Completion / hold: New satisfactory performance restores only a bounded current capability after independent acceptance; old evidence is not rewritten.

Record contract: the actor records the input baseline, actual work, deviations, result and evidence link; the named receiving function acknowledges access and the permitted next action. A returned or incomplete handover retains the original event history. Use the associated FR modules and RG record links; no document or database field confers actual authority.

AF-AST-PR-012 – Technical Reporting, Amendments and Report Review

Implementation basis: 9.7 (p. 20); 13.5 (p. 25); 28.1 (p. 45); 62.3 (p. 88); 62.4 (p. 88); 65.6 (p. 95); 67.3 (p. 98); 74.6 (p. 113); 77.5 (p. 118); 77.8 (p. 119); 80.4 (p. 124)

X12.1 Reconcile output identity and basis

Confirm actual item, configuration, method, site, period, performer, conditions, raw evidence, corrections and authorised signatory.

Completion / hold: A report title or customer description cannot substitute for verified identity and scope.

X12.2 Separate observed result from interpretation

Label measured, model-derived, declared and unknown information; state uncertainty, detection/access limits and the justified population.

Completion / hold: Qualification, provider competence, scientific inference and operational permission are not interchangeable report conclusions.

X12.3 Control adverse and amended reports

Keep earlier issued versions, exact correction reason, affected characteristics, original failures and recipients who may have relied on them.

Completion / hold: A replacement favourable report cannot erase a valid adverse result or make a missing observation contemporaneous.

X12.4 Review publication against authority

Compare report, scope schedule, registry and public claim with the actual independent decision. Use the printed edition date only as publication identity.

Completion / hold: Every communicated result retains its actual event history and no unsupported broader scope.

Record contract: the actor records the input baseline, actual work, deviations, result and evidence link; the named receiving function acknowledges access and the permitted next action. A returned or incomplete handover retains the original event history. Use the associated FR modules and RG record links; no document or database field confers actual authority.

AF-AST-PR-013 – Nonconformity, Containment and Corrective Action

Implementation basis: 14.1 (p. 25); 14.2 (p. 25); 14.3 (p. 26); 14.4 (p. 26); 14.5 (p. 26); 54.4 (p. 79); 62.3 (p. 88); 62.5 (p. 89); 77.5 (p. 118); 77.7 (p. 119); 79.4 (p. 122)

X13.1 Separate evidence gap, technical failure and finding

Record whether data are valid before declaring a failed property. State the exact requirement, observed gap, affected scope and independent classification.

Completion / hold: HOLD is not proof of product failure, but a demonstrated control failure still needs an appropriate finding.

X13.2 Protect and trace the shared extent

Stop or restrict affected use under actual authority, preserve evidence and trace common source, equipment, software, method and personnel dependencies.

Completion / hold: Protection and existing notification clocks run without waiting for root-cause wording or a replacement report.

X13.3 Test occurrence and escape causes

Use competing explanations, actual history, control design, workload and interface evidence. Define effectiveness criteria and exposure before retest.

Completion / hold: Issuing training, changing an owner or recalibrating equipment alone does not close a systemic cause.

X13.4 Close with prospective evidence

Re-execute the original failure mechanism and necessary regression, reconcile prior outputs and recipients, and independently approve closure.

Completion / hold: No grant, renewal or extension with an open in-scope finding; later correction does not backdate earlier validity.

Record contract: the actor records the input baseline, actual work, deviations, result and evidence link; the named receiving function acknowledges access and the permitted next action. A returned or incomplete handover retains the original event history. Use the associated FR modules and RG record links; no document or database field confers actual authority.

E4 Application-specific parameter completion

These are required information groups from Annex AO, not pre-approved engineering limits. For every triggered group, populate actual values or observable attributes before evaluation, with unit, inclusivity, phase/mode, technical derivation, uncertainty/dependence, method version, owner, independent review, authentic approval and change trigger. An absent trigger requires an approved exclusion; an unsupported or missing essential value is HOLD.

P01 — Mission and scope

Legal owner, performer, family/module, object, domain, configuration, location, duration and modes.

Derivation and evidence: Scope tuple and mission concept; approved applicability matrix.

Completion test: No undefined essential object, duty, phase or exclusion.

P02 — Environment and exposure

Quantity, spatial/temporal boundary, distribution or bound, source/model, uncertainty and coupled effects.

Derivation and evidence: Mission environment baseline and qualified specialist rationale.

Completion test: Selected conditions bound each claimed use; unknown critical mechanisms remain HOLD.

P03 — Requirements and acceptance

Stable ID, owner, characteristic, units, bound inclusivity, predicate, observation and essential-step marker.

Derivation and evidence: Requirement baseline and Annex AL decision rule.

Completion test: Every condition is evaluable before observations are judged.

P04 — Geometry and reference systems

Frame origin/orientation, epoch, time scale, coordinate units, transformation and covariance.

Derivation and evidence: Validated transformation and independent known-answer checks.

Completion test: Correct frame and time are maintained through every interface.

P05 — Materials and process qualification

Material type/condition, geometry, sources, variables, qualified window, machine/tool state and hidden properties.

Derivation and evidence: Actual representative qualification; lot/build genealogy.

Completion test: All influential variables and required product properties are supported.

P06 – Test article and fixtures

Article pedigree, differences from delivered object, mounting, boundary conditions, operating state and exposure history.

Derivation and evidence: Approved representativeness and cumulative-test analysis.

Completion test: No material difference or prior damage invalidates the intended inference.

P07 – Measurement and uncertainty

Measurand, instrument/range, corrections, sensitivity, covariance, coverage, time/space sampling and calibration.

Derivation and evidence: Complete measurement model; valid raw data.

Completion test: Uncertainty and detection capability are fit for the approved decision rule.

P08 – Structure, life and mechanisms

Loads, allowables, factors, life, geometry, material state, mechanisms, detectability and approved reserve.

Derivation and evidence: Qualified structural/life model and representative evidence.

Completion test: Each prospectively defined margin and essential mechanism predicate passes.

P10 – Thermal and environmental control

Node/location, mode, temperatures/gradients, heat inputs, sink/view factors, properties, uncertainty and transient cases.

Derivation and evidence: Correlated thermal model and applicable environment tests.

Completion test: All required hot, cold and transition conditions meet approved limits.

P11 – Communication and timing

Distance, frequency/wavelength, gain/loss, noise, rate, margin, latency, event time, age, clock error and outage.

Derivation and evidence: Validated end-to-end budget and adverse service tests.

Completion test: Required quality, delay and integrity conditions all pass.

P12 – Human and protective response

User/task, representative conditions, essential steps, feasible intervention, health-support interface and emergency resources.

Derivation and evidence: Specialist criteria and observed performance.

Completion test: Every essential protection is effective; no invented universal physiological limit.

P13 – Contamination and samples

Relevant substances/particles, pathway, limit, method/detection, custody, cleanliness, containment and receiving.

Derivation and evidence: Mission-specific technical/protection basis.

Completion test: Required integrity and scientific cleanliness are demonstrated for the actual sample/use.

P14 – Software, AI and models

Purpose/domain, source/build/weights/data, dependencies, target, errors, uncertainty, prohibited behaviour and change limits.

Derivation and evidence: Independent verification and model/use validation.

Completion test: Essential scenarios and target conditions pass; experimental outputs remain separate.

P16 – Reliability and availability

Population, exposure, failure definition, observation, dependencies, confidence model, downtime and maintenance exclusions.

Derivation and evidence: Prospective statistical design plus engineering mechanism evidence.

Completion test: The actual demonstrated bound meets the approved claim; zero failures is not zero risk.

P18 – Decision, continuity and terminal duties

Closed findings, reviewer competence, independence, authority, status clocks, final-state criteria, custody and open obligations.

Derivation and evidence: Authenticated decisions and verified terminal/transfer evidence.

Completion test: Every mandatory gate is complete; incomplete or unknown terminal state remains explicit.

E5 All-space applicability and bounded responsibility

The following Annex AK tags are selected because the document can support these responsibilities. Applicability is decided for the actual case. Tags do not expand a family, create an operating permission or place a whole mission inside a supplier's limited scope. Resolve domain, phase, mode, environment and retained duty before accepting a claim.

Domain / source page	Coverage	Required boundary
AK01 / 187 Terrestrial engineering and supply	Design offices, manufacturing, material sources, procurement and integration.	Every delivered characteristic and essential supplier interface is traceable to accepted evidence.
AK02 / 187 Test facilities and technical providers	Environmental, structural, materials, calibration and inspection services, including mobile and remote work.	Actual method competence and valid result evidence are separately demonstrated.
AK03 / 187 Launch sites and spaceports	Site infrastructure, handling, ground services, emergency interfaces and actual permissions.	No site outcome is used as vehicle, launch or mission permission.
AK04 / 187 Launch and deployment interfaces	Vehicle/payload integration, handling, ascent environment, separation and commissioning.	Every required integration and protective condition is met before the actual commitment.
AK05 / 188 Reusable launch and return articles	Cumulative exposure, refurbishment, thermal protection, hidden damage and life decisions.	Reuse is based on actual history and accepted condition, never a reset life.
AK06 / 188 Low Earth orbit systems	Satellites, stations and services in the declared near-Earth operating environment.	Environment-specific qualification and end-of-life capability support the bounded mission.
AK07 / 188 Medium, geosynchronous and high Earth orbits	Navigation, communication, relay and other specified orbit-dependent services.	No lower-orbit or nominal-link evidence automatically covers a different environment.
AK08 / 188 Highly elliptical and transfer regions	Missions crossing materially different exposure, geometry and communication regimes.	Every phase and transition has a supported envelope and verification path.
AK09 / 189 Cislunar and libration-region systems	Lunar vicinity, relays, gateways, transportation interfaces and regional services.	The exact operating domain and service dependencies are technically complete.
AK10 / 189 Constellations and formation services	Distributed functions, inter-satellite links, fleet management and shared ground support.	Distributed performance and independent redundancy assumptions are validated.

Domain / source page	Coverage	Required boundary
AK11 / 189 Orbital traffic and tracking support	Tracking, conjunction information, data services and inter-operator coordination.	A metric is accepted only for its validated data/model scope; missing data are not zero risk.
AK12 / 189 Cooperative docking and servicing	Authorised inspection, connection, transfer, repair and service interventions.	All essential interface and completion states are independently supported.
AK13 / 190 On-orbit assembly and manufacture	Assembly, additive or other production, finishing and output verification in space.	Process execution is not substituted for evidence of required output properties.
AK14 / 190 Stations and inhabited orbital platforms	Habitation, payload integration, visiting vehicles, occupants and support.	Integrated human protection and resources are accepted independently of mission success.
AK15 / 190 Extravehicular and isolated crew work	Individual equipment, user/task, environment, support and rescue dependencies.	Essential individual and integrated protective tasks pass without averaging.
AK16 / 190 Lunar surface systems	Landers, rovers, infrastructure, observation and processing on the Moon.	Destination-specific evidence bounds the actual region, phase and operating mode.
AK17 / 191 Planetary landers and surface vehicles	Surface exploration, scientific instruments, mobility and handling.	Terrestrial analogy is justified; unknown critical surface conditions remain restricted.
AK18 / 191 Atmospheric and buoyant exploration	Planetary atmospheric vehicles, balloons, aircraft and relevant instruments.	All relevant environment-specific structural and functional predicates pass.
AK19 / 191 Small-body and comet operations	Observation, cooperative contact, sampling and resource demonstrations.	Uncertain body/interaction properties are not treated as established terrestrial conditions.
AK20 / 191 Subsurface and ocean-world exploration	Subsurface, liquid, ice and extreme-pressure exploration systems and their interfaces.	Specialist boundary and contamination evidence precedes dependent use.
AK21 / 192 Interplanetary cruise and deep-space missions	Spacecraft, relays, science operations and long-delay mission support.	Human and autonomous actions are feasible within actual timing and resource limits.
AK22 / 192 Solar and heliophysics missions	Solar observations and missions with relevant thermal, plasma and radiation extremes.	Protection and data-quality evidence cover the actual mission envelope, not a screening equation alone.
AK23 / 192 Outer-system and distant observatories	Low-flux, long-life, long-delay science and infrastructure applications.	Required lifetime and survival margins are met with credible continuity and data integrity.
AK24 / 192 Interstellar precursor and future distant systems	Bounded research and demonstrable capabilities for very long-range or novel concepts.	Research promise is not an operational grant; unsupported capability stays in development.
AK25 / 193 Human exploration and surface habitats	Crew transport interfaces, habitation, exploration support and emergency protection.	Every essential human protection and feasibility predicate is supported by specialists.
AK26 / 193 Planetary protection and sample return	Forward/backward contamination, scientific cleanliness, samples and receiving chain.	No dependent commitment precedes complete protection and receiving evidence.
AK27 / 193 Resource utilisation and remote processing	Resource characterisation, processing, quality, storage, use and residues.	Resource yield, product eligibility and permission remain distinct.
AK28 / 193 Space logistics and distributed supply	Warehousing, transfer, spares, custody, condition, receiving and service continuity.	Only physically or otherwise validly confirmed accepted usable inventory supports mission budgets.

Domain / source page	Coverage	Required boundary
AK29 / 194 Specialised energy infrastructure	Generation, storage, conversion, remote delivery and controlled high-hazard power interfaces.	Performance never substitutes for safety, source authority or terminal accountability.
AK30 / 194 Ground, communication and navigation services	Mission control, RF/optical links, timing, data processing, relays and PNT support.	Availability, correctness, authority and completion are separately demonstrated.
AK31 / 194 Digital and autonomous space systems	Software, programmable hardware, AI, models, twins and defensive security.	All essential behaviours and prohibited transitions are verified for the actual deployment.
AK32 / 194 Retirement and long-term stewardship	Disposal, passivation governance, loss-of-contact states, records and residual obligations.	Final-state claims are truthful and every unresolved duty has an accepted owner.

E6 Workflow and evidence relationships

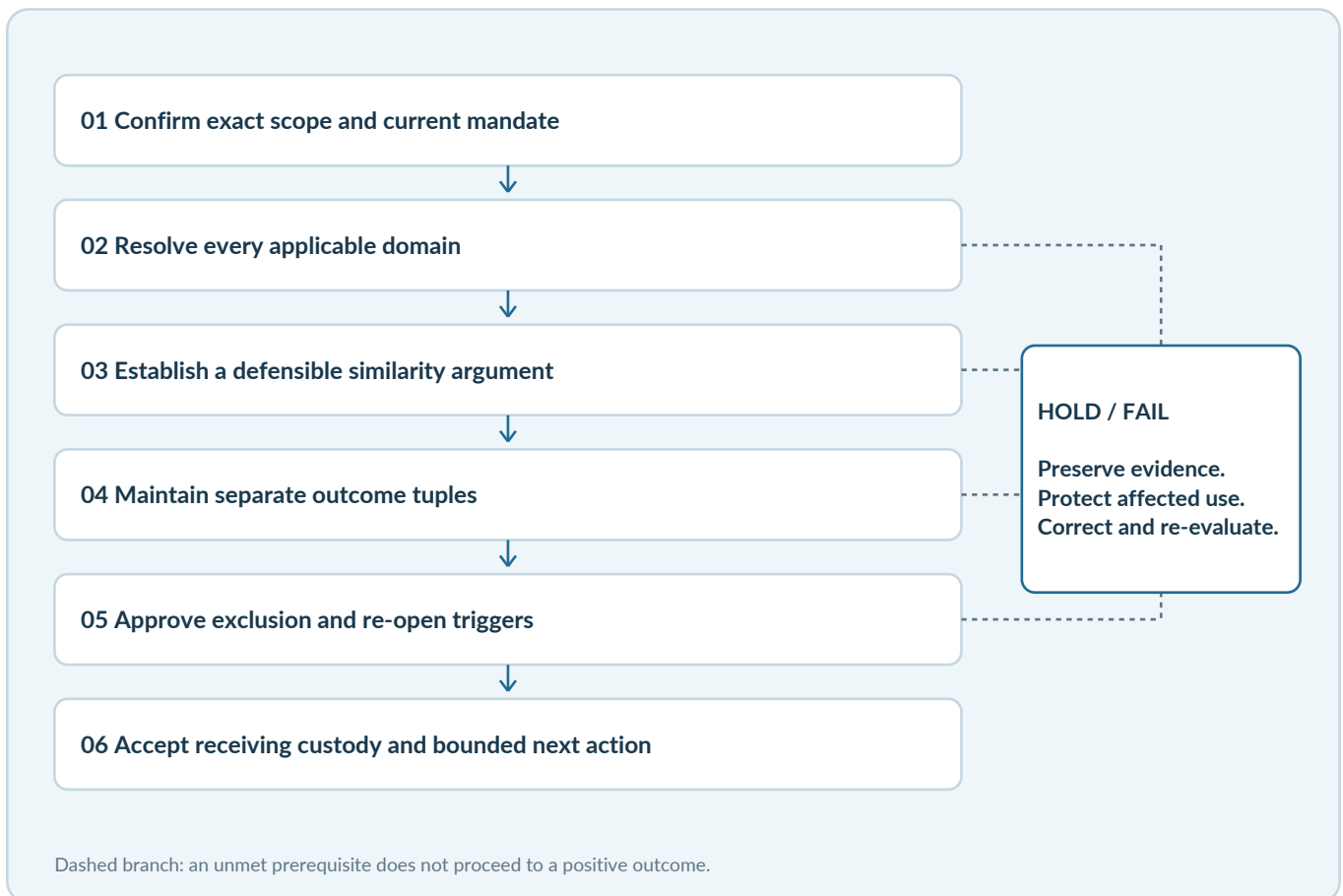
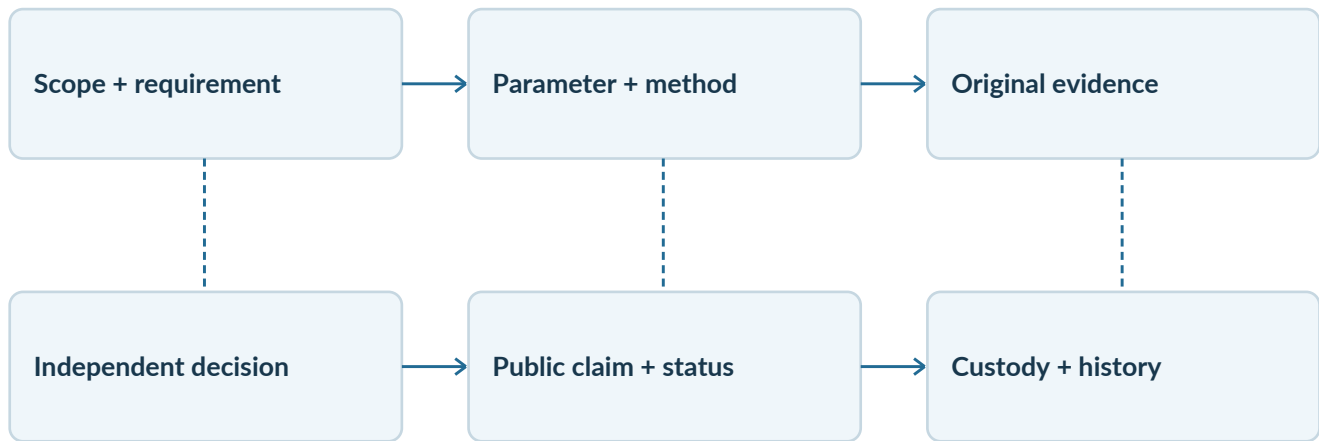


Figure — Implementation sequence for AF-AST-PR-004. Explanatory diagram; the source prerequisites and actual authority remain controlling.



Each relationship carries object identity, controlled version, actual event time and purpose-specific validity.

Figure — Scope-to-custody evidence relationships. A relationship is validated for its decision purpose, not merely because two identifiers exist.

E7 Calculations, assumptions and synthetic charts

The worked calculations below reproduce the supplied standard's Annex AM examples. Charted extensions are newly computed synthetic illustrations of those equations, not measured mission performance or new universal limits. A result is usable only when the actual inputs, model, units, uncertainty and approved application predicate are valid. A successful arithmetic check is not field validation.

AM.Q01 Measurement uncertainty and covariance

Source: ASTRA Annex AM, Q01, page 200. All numerical inputs in this example are synthetic.

$$u_c^2 = \sum(c_i^2 u_i^2) + 2\sum(i < j)(c_i c_j cov_{ij})$$

$$U = k u_c$$

Variables and units

u_i is a standard uncertainty; c_i is a sensitivity coefficient; cov_{ij} is covariance; k is the justified coverage factor. Variance terms carry squared output units.

Example inputs

Synthetic direct sum: $c_1=c_2=1$; $u_1=0.003$ mm; $u_2=0.004$ mm. First assume independence, then correlation $\rho=0.5$. Illustrative $k=2$.

Calculation and checks

1. Independent variance = $0.003^2 + 0.004^2 = 0.000025$ mm².
2. $u_c = 0.005$ mm; $U = 0.010$ mm for the stated k .
3. Correlated covariance = $0.5 \times 0.003 \times 0.004 = 0.000006$ mm².
4. Correlated variance = $0.000025 + 2 \times 0.000006 = 0.000037$ mm².
5. Correlated $u_c = 0.0060827625303$ mm; $U = 0.0121655250606$ mm.

Decision interpretation: The correlated model produces a larger uncertainty. No PASS/FAIL follows until an approved specification and decision rule are applied.

Validity limits: The linear propagation model requires a valid measurement function and adequate approximation. $k=2$ is not a universal guarantee of 95% coverage. Known bias requires correction or explicitly justified treatment; uncertainty does not conceal missing requirements.

ASTRA connections: 9.4–9.5; Annex G; 62; 77

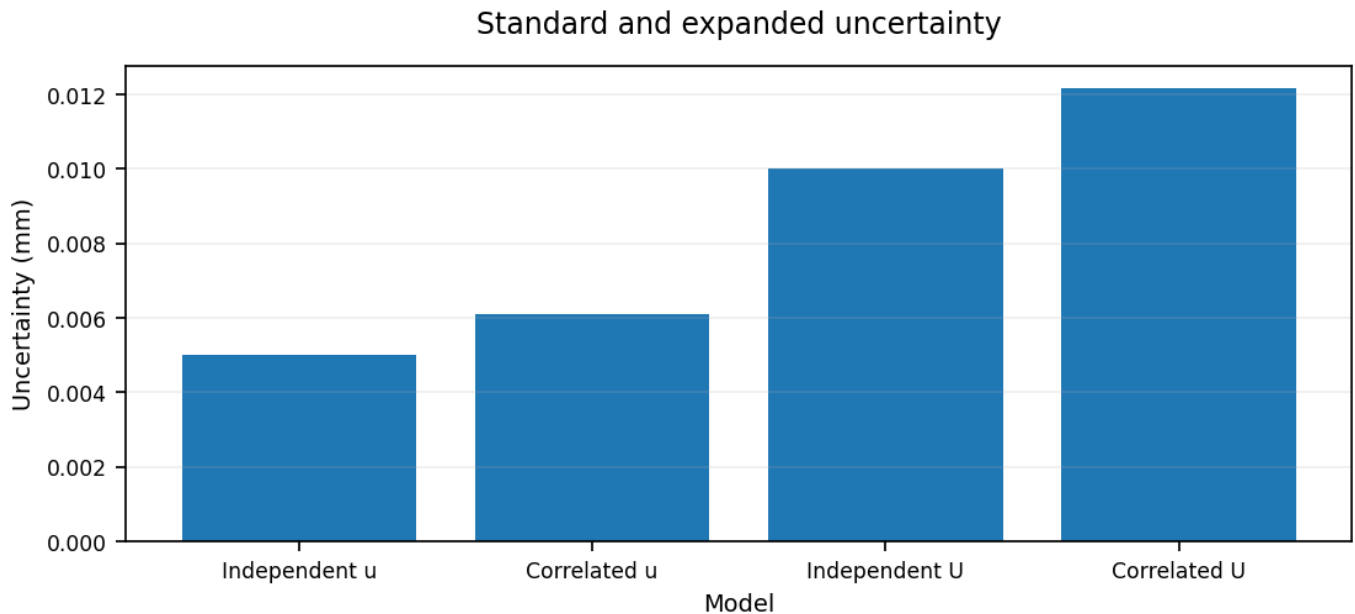


Figure Q01 — Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q02 Inclusive limits and four distinct measurement outcomes

Source: ASTRA Annex AM, Q02, page 201. All numerical inputs in this example are synthetic.

PASS: $y - U \geq L$ AND $y + U \leq H$

FAIL: $y + U < L$ OR $y - U > H$

Otherwise: HOLD; invalid evidence also results in HOLD

Variables and units

L and H are inclusive specification limits; y is a corrected result; U is a non-negative expanded uncertainty with stated coverage.

Example inputs

Synthetic specification [49.970, 50.030] mm; U=0.004 mm. Results y=50.024, 50.028, 50.036 and 50.026 mm.

Calculation and checks

1. $50.024 \pm 0.004 \rightarrow [50.020, 50.028]$ mm: PASS.
2. $50.028 \pm 0.004 \rightarrow [50.024, 50.032]$ mm: HOLD, interval overlaps the upper limit.
3. $50.036 \pm 0.004 \rightarrow [50.032, 50.040]$ mm: FAIL, interval entirely above the limit.
4. $50.026 \pm 0.004 \rightarrow [50.022, 50.030]$ mm: PASS; equality is inside the inclusive upper bound.

Decision interpretation: Neither the overlapping interval nor an invalid run is rounded into acceptance. N/A is an applicability decision, not a measurement outcome.

Validity limits: Use actual endpoints for asymmetric intervals. For an upper-only limit, PASS requires the upper endpoint at or below the limit and FAIL the lower endpoint above it. A coverage interval is not automatically a probability that this particular item conforms.

ASTRA connections: Annex G; 62.3–62.5; 77.6

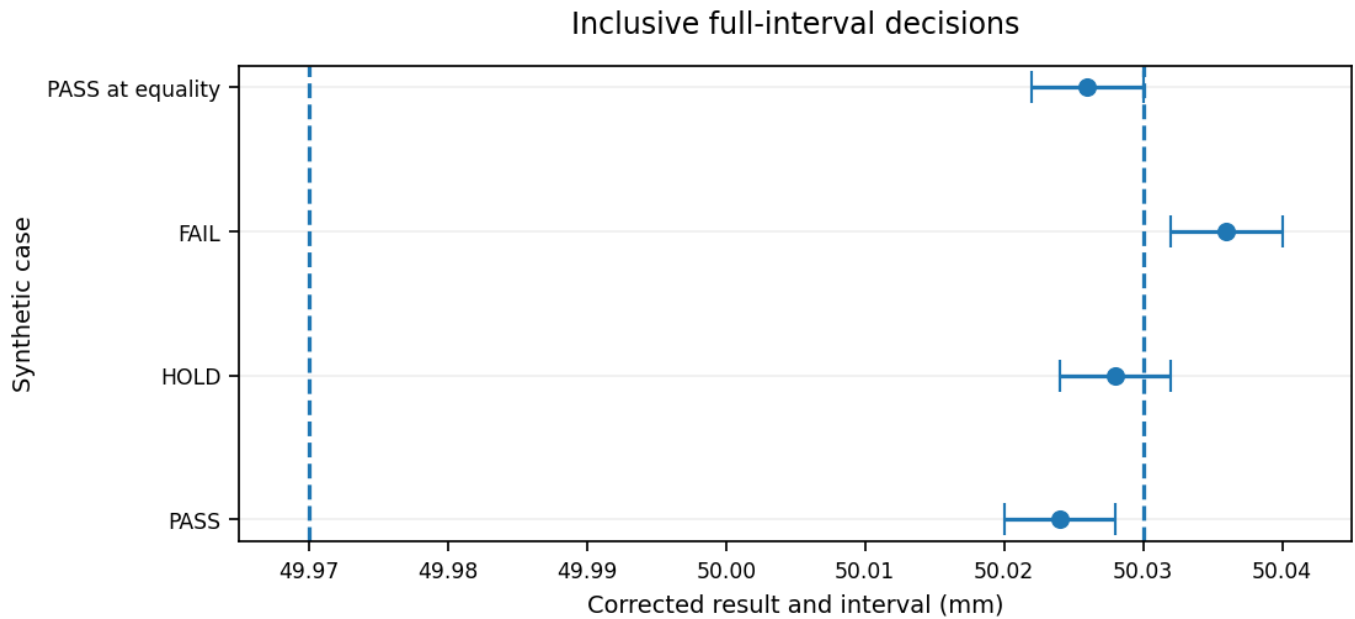


Figure Q02 – Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q03 Positive-decision conjunction and essential failure

Source: ASTRA Annex AM, Q03, page 202. All numerical inputs in this example are synthetic.

$G = S \wedge P \wedge E \wedge F \wedge C \wedge I \wedge A$

Requirement completion = completed applicable rows / all applicable rows

Variables and units

S=valid scope; P=all predicates passed; E=adequate valid evidence; F=all in-scope findings closed; C=competence; I=independence; A=actual authority.

Example inputs

A synthetic file has 200 applicable rows; 190 are complete. One remaining row concerns an essential protective control. Six other gate groups are true.

Calculation and checks

1. Completion = $190/200 = 0.95 = 95\%$.
2. The unverified essential row makes P false and E false for the requested conclusion.
3. $G = \text{true false false} \dots = \text{false}$.

Decision interpretation: No positive grant. The completion percentage is a planning measure only. A conditional development permission is a separate bounded action, not a conformity certificate.

Validity limits: No averaging, vote or commercial action can change a false mandatory gate. N/A requires independent approval of the absent trigger; it is not a way to remove unfinished work.

ASTRA connections: 15.2; Annex G.1; 62.5; 80

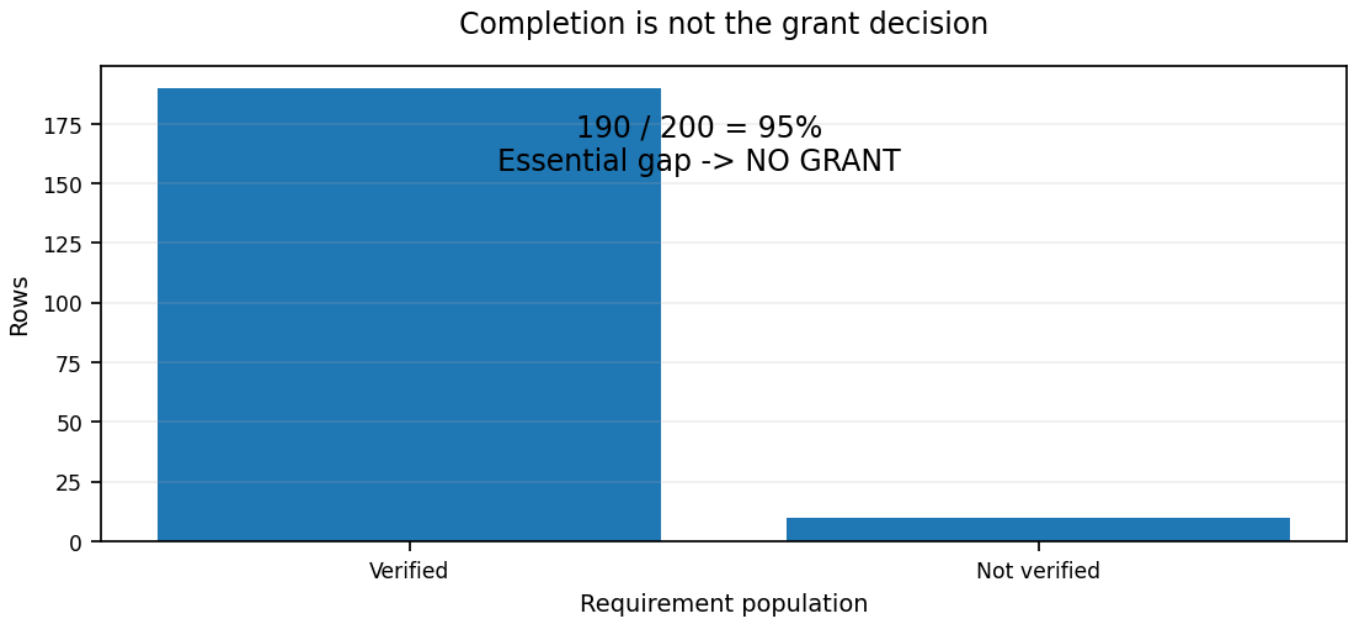


Figure Q03 — Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q04 Committee arithmetic and accreditation panels

Source: ASTRA Annex AM, Q04, page 203. All numerical inputs in this example are synthetic.

Substantive participation minimum = $\text{ceil}(2N/3)$

Affirmative minimum = $\text{ceil}(2V/3)$

Variables and units

N is the eligible committee population; V is the number of substantive yes/no votes. These equations concern the technical committee, not an applicant panel.

Example inputs

Synthetic committee: N=9, V=6, yes=4, no=2. Separate accreditation panel: three eligible members, two affirmative and one adverse.

Calculation and checks

1. Participation: $\text{ceil}(2 \times 9/3) = 6$; actual V=6 meets it.
2. Affirmative: $\text{ceil}(2 \times 6/3) = 4$; actual yes=4 meets it.
3. Accreditation panel: all three must participate; at least two support and all technical gates must pass.
4. Two participating panel members voting yes do not form a valid three-person panel.

Decision interpretation: The committee arithmetic passes for the stated case. The separate panel can decide positively only if technical gates and eligibility are all established.

Validity limits: Abstentions are not substantive committee yes/no votes. Rounding is upward. A mathematical majority never resolves missing technical evidence or an ineligible member.

ASTRA connections: 3.4; 4.3; 15.3; Annex B

Committee participation threshold

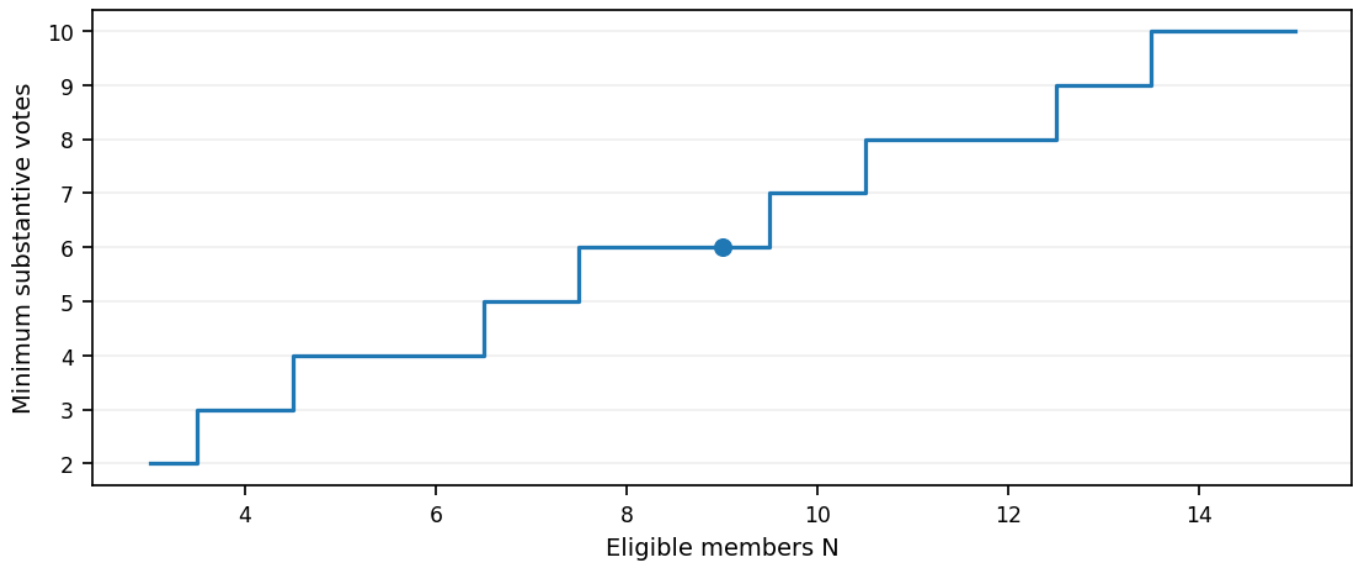


Figure Q04 – Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q05 Productive evaluation time without double counting

Source: ASTRA Annex AM, Q05, page 204. All numerical inputs in this example are synthetic.

$$T_{\text{eval}} = \sum h_i / 8 \text{ evaluator-days}$$

Total resource = evaluation + separate reporting/review/travel resources

Variables and units

h_i are distinct productive technical person-hours. Shared tasks are counted once unless distinct real work is documented.

Example inputs

Synthetic tasks: 12, 12, 12, 8 and 4 productive hours. Report 6 h; independent review 5 h; panel 3 person-hours.

Calculation and checks

1. Evaluation hours = $12+12+12+8+4 = 48$ h.
2. $T_{\text{eval}} = 48/8 = 6$ evaluator-days.
3. Separate report/review/panel time = $6+5+3 = 14$ person-hours.
4. Total stated technical resources = 62 person-hours before travel and other separately justified work.

Decision interpretation: Six evaluator-days describes only this synthetic activity breakdown. It is not a universal minimum or quotation.

Validity limits: Do not count a trainee as an independent productive assessor or two passive observers as two completed tasks. Calendar duration, person-hours and evaluator-days are distinct.

ASTRA connections: 12.4; Annex F.1; 58.2

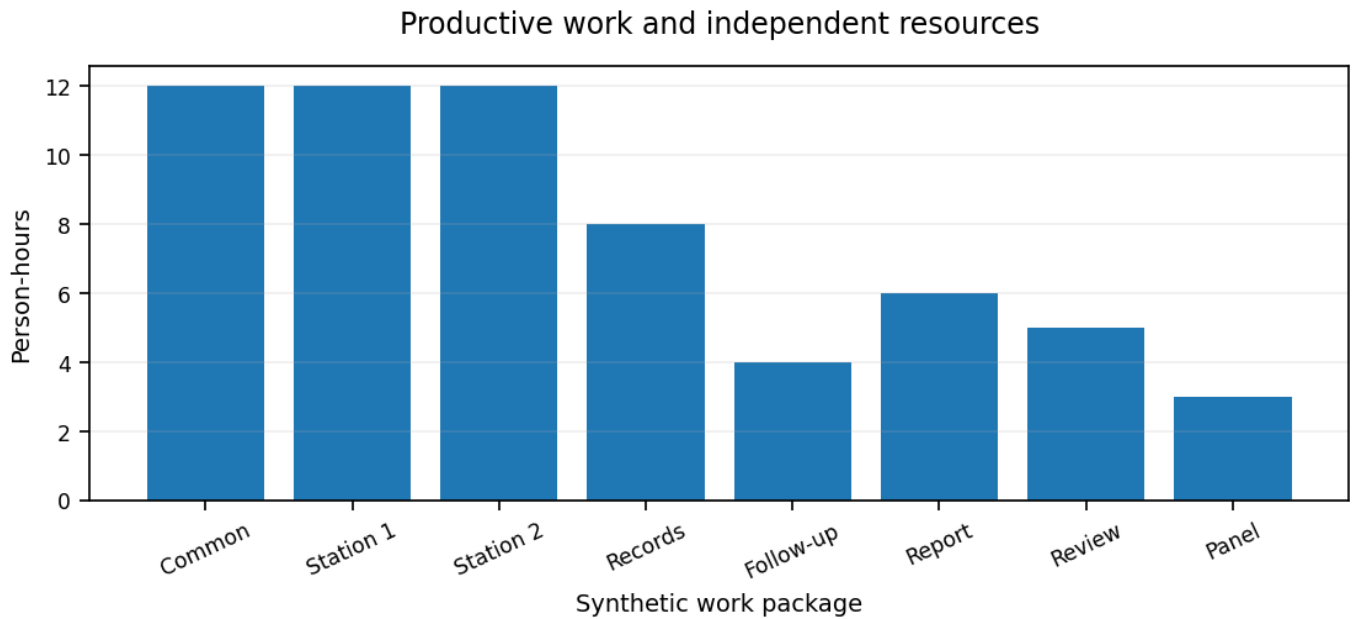


Figure Q05 — Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q06 Random detection sample size

Source: ASTRA Annex AM, Q06, page 205. All numerical inputs in this example are synthetic.

$$P(\text{at least one detection}) = 1 - (1-p)^n$$

$$n_{\min} = \text{ceil}[\ln(1-C)/\ln(1-p)]$$

Variables and units

p is a fixed issue probability per independent representative observation; C is the selected target detection probability; n is a positive integer.

Example inputs

Synthetic $p=0.10$ and $C=0.95$.

Calculation and checks

1. $\ln(0.05)/\ln(0.90) = 28.433158...$; round upward to $n=29$.
2. $P(\text{detection at } n=29) = 1 - 0.9^{29} = 0.9528987130$.
3. At $n=28$, $P = 0.9476652367$, below the specified target.

Decision interpretation: 29 is the minimum integer sample for the stated independent model; the demonstration does not certify 95% conformity.

Validity limits: This calculation is invalid for unexamined dependence, changing p , biased selection or a judgemental sample represented as random. Detection is also conditional on an effective observation method.

ASTRA connections: 9.3; Annex F.5; 55.3

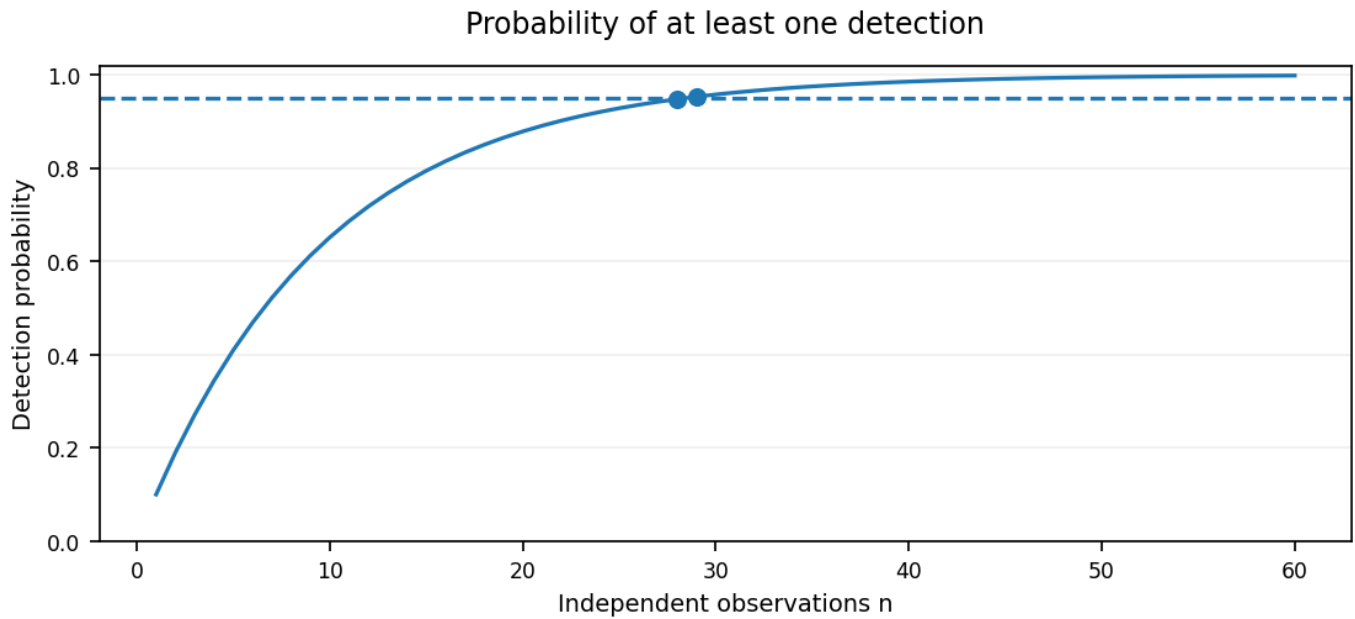


Figure Q06 – Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q07 Zero observed failures and an exact binomial bound

Source: ASTRA Annex AM, Q07, page 206. All numerical inputs in this example are synthetic.

$$p_{\text{upper}} = 1 - \alpha^{(1/n)}$$

$$n_{\text{min}} = \text{ceil}[\ln(\alpha) / \ln(1 - p_{\text{target}})]$$

Variables and units

α =1-confidence; n is a prospectively fixed number of independent comparable binary trials; all n trials have zero observed failures.

Example inputs

Synthetic one-sided confidence 95%, so $\alpha=0.05$. Examine $n=30$ and a target upper failure probability of 0.01.

Calculation and checks

- For $n=30$: $p_{\text{upper}} = 1 - 0.05^{(1/30)} = 0.095033853 = 9.5033853\%$.
- For $p_{\text{target}}=0.01$: $\text{ceil}[\ln(0.05) / \ln(0.99)] = 299$.
- For $n=299$: $p_{\text{upper}} \approx 0.0099691468$, below 1%.

Decision interpretation: Thirty successful trials do not demonstrate a failure probability below 1%. Under the specified model, 299 all-success trials are needed for that particular bound.

Validity limits: A statistical upper confidence bound is not proof of zero risk or total system safety. Nonrepresentative trials, changing configuration, adaptive stopping or unmodelled common causes invalidate this simple inference.

ASTRA connections: 55.1–55.3; 62; 77

Zero failures: one-sided 95% binomial bound

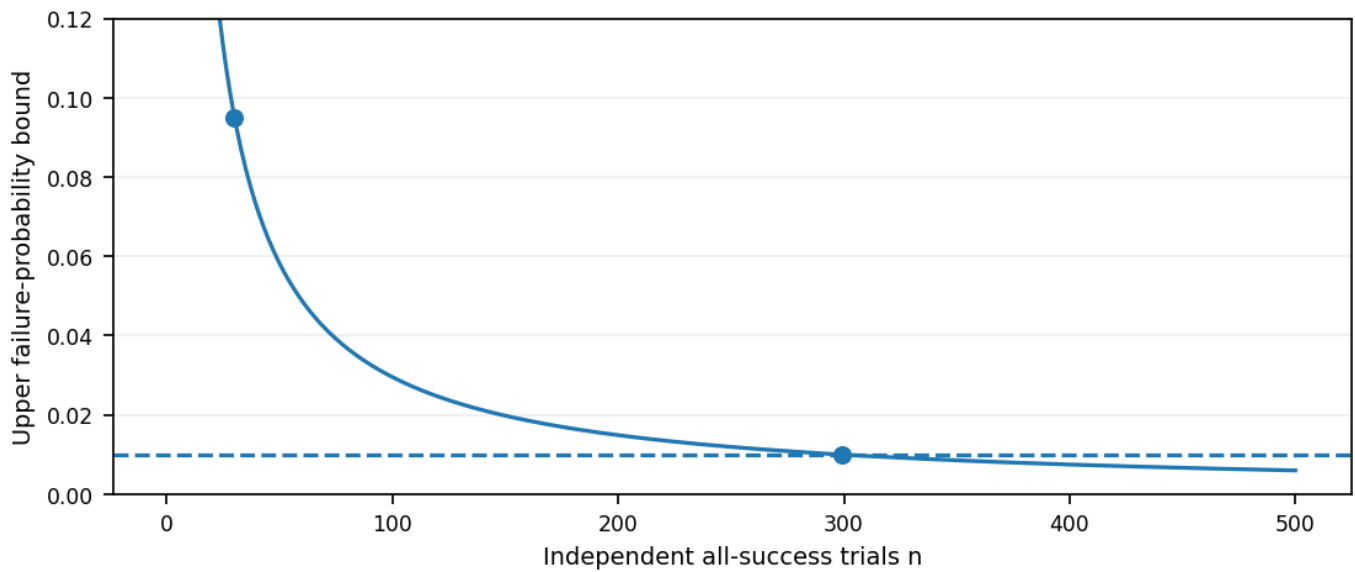


Figure Q07 – Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q08 No failures during exposure: exponential bound

Source: ASTRA Annex AM, Q08, page 207. All numerical inputs in this example are synthetic.

$$\lambda_{\text{upper}} = -\ln(\alpha)/T$$

$$\text{MTBF}_{\text{lower}} = T/[-\ln(\alpha)]$$

Variables and units

T is total comparable exposure time under a justified constant-rate model; $\alpha=1$ -confidence; no failures occur. λ has reciprocal-time units.

Example inputs

Synthetic T=800 operating hours; one-sided confidence=95%, $\alpha=0.05$.

Calculation and checks

1. $-\ln(0.05) = 2.9957322736$.
2. $\lambda_{\text{upper}} = 2.9957322736/800 = 0.003744665342 \text{ h}^{-1}$.
3. $\text{MTBF}_{\text{lower}} = 800/2.9957322736 = 267.0465606 \text{ h}$.

Decision interpretation: The observed zero-failure record supports only the stated model-based lower bound, not infinite mean life.

Validity limits: Ageing, wear-out, maintenance quality, heterogeneity and common causes may violate the constant-rate assumption. MTBF is not a guaranteed individual life and does not extend a mandatory life limit.

ASTRA connections: 55; 79

Zero failures: constant-rate model bound

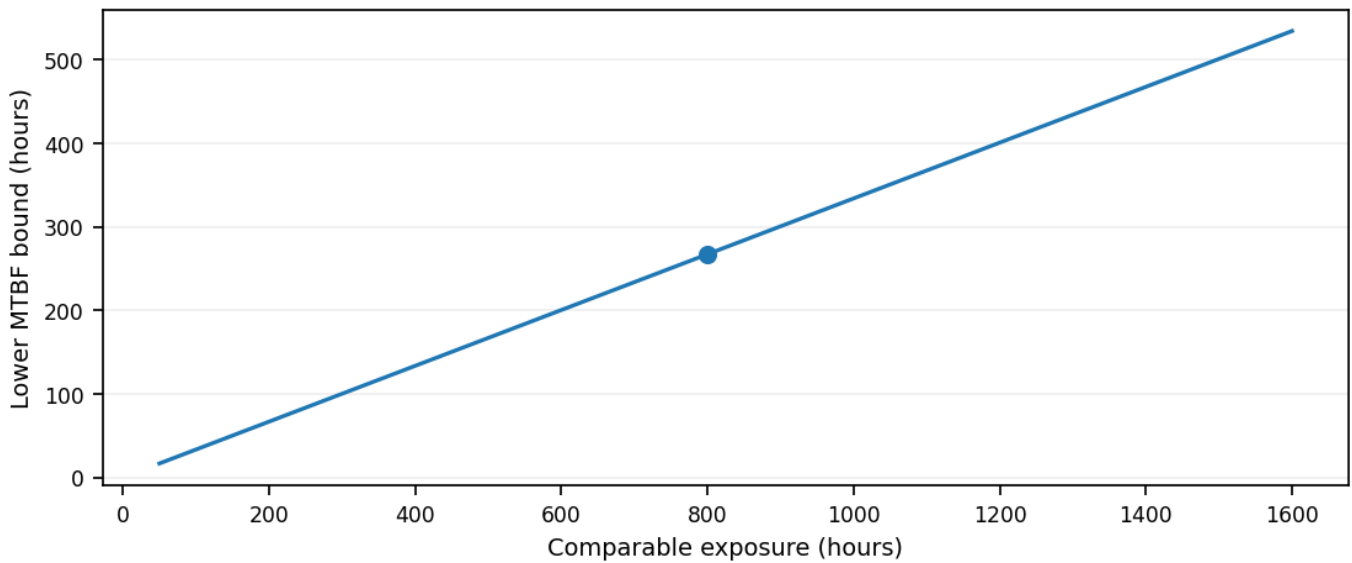


Figure Q08 — Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q09 Availability is not output correctness

Source: ASTRA Annex AM, Q09, page 208. All numerical inputs in this example are synthetic.

$$A_{\text{observed}} = T_{\text{available}} / T_{\text{window}}$$

$$\text{Correct-service fraction} = T_{\text{available_and_correct}} / T_{\text{window}}$$

Variables and units

All categories shall use the same declared window and explicit downtime and integrity definitions. Missing time is separately recorded.

Example inputs

Synthetic window=1,000 h; available=960 h; unavailable=40 h. Of the available time, 20 h produced unacceptable information.

Calculation and checks

1. Availability = $960 / 1,000 = 96\%$.
2. Available-and-correct time = $960 - 20 = 940$ h.
3. Correct-service fraction = $940 / 1,000 = 94\%$.

Decision interpretation: The 96% availability value does not prove correctness during every available hour. The two measures support different requirements.

Validity limits: The service boundary, outages, correctness test, unknown intervals and planned exclusions must be established in advance. A high uptime percentage cannot close an integrity failure.

ASTRA connections: 51.4; 55.1; 66.7; 78.7

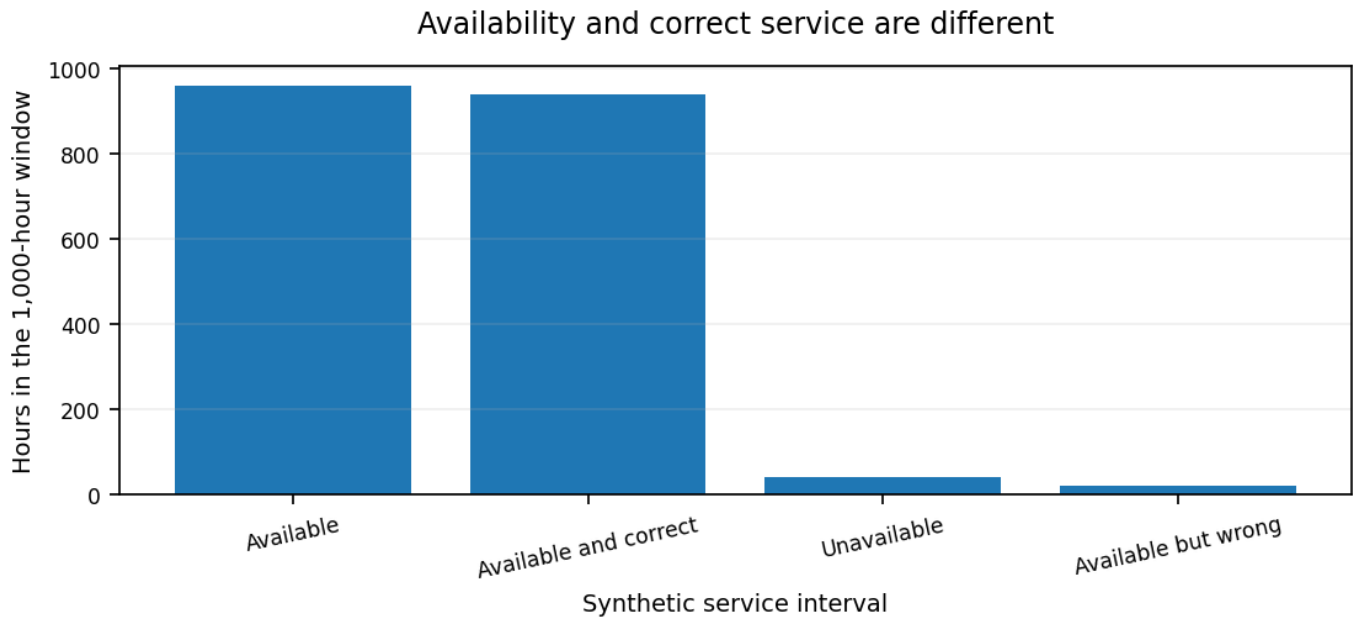


Figure Q09 – Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q17 Clock uncertainty and maximum data age

Source: ASTRA Annex AM, Q17, page 216. All numerical inputs in this example are synthetic.

$u_t = \sqrt{u_{\text{event}}^2 + u_{\text{sync}}^2}$ for justified independence

$U_t = k u_t$

Upper age endpoint = age_estimate + U_t

Variables and units

Time components refer to the same event and time basis. Correlation and systematic conversion errors require appropriate treatment.

Example inputs

Synthetic standard components 3 ms and 4 ms; illustrative $k=2$; maximum inclusive permitted data age=100 ms.

Calculation and checks

- $u_t = \sqrt{3^2 + 4^2} = 5$ ms; $U_t = 10$ ms.
- At age estimate 95 ms, interval=[85,105] ms: HOLD under the full-interval rule.
- At age estimate 80 ms, interval=[70,90] ms: PASS for this age criterion.

Decision interpretation: A recently received packet can still contain stale event data. The 95 ms estimate is not rounded down into acceptance.

Validity limits: This calculation does not account automatically for unrecorded queueing, an incorrect epoch or an unknown time scale. Such validity defects cause HOLD before the age predicate is evaluated.

ASTRA connections: 66.4; Annex G; 77.6

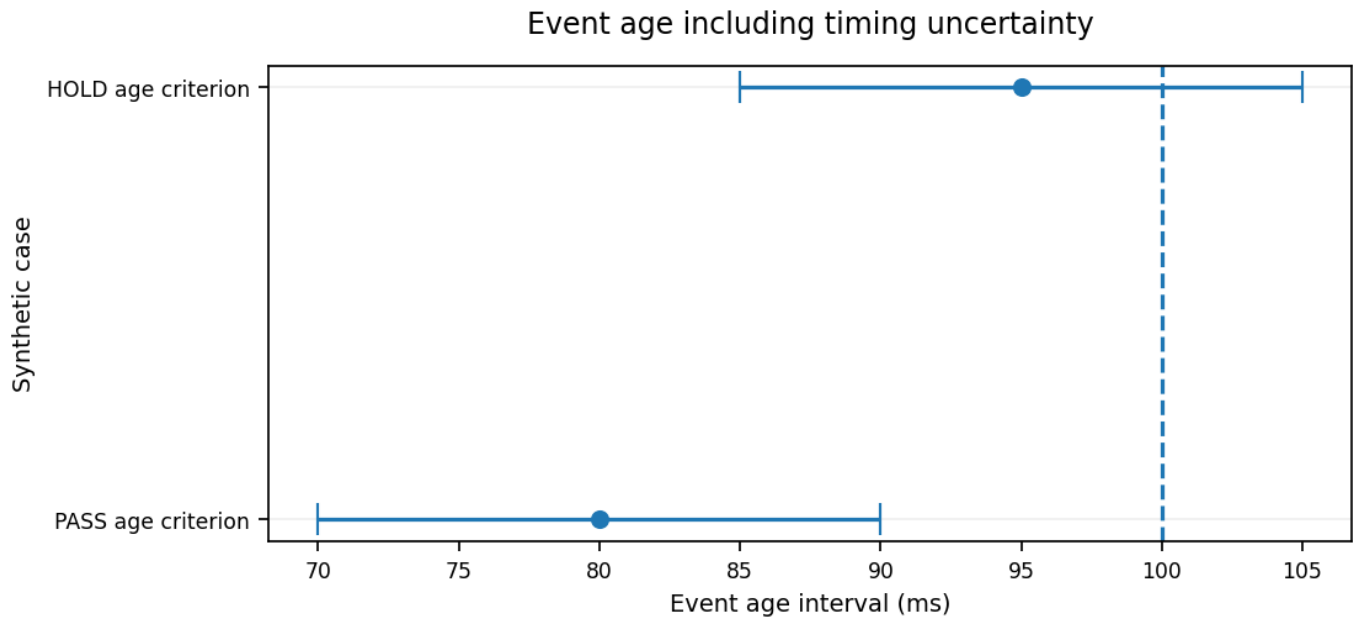


Figure Q17 – Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q18 Structural margin with explicitly assigned factors

Source: ASTRA Annex AM, Q18, page 217. All numerical inputs in this example are synthetic.

$$MS = \text{allowable_lower_bound} / (\text{factor} \times \text{demand_upper_bound}) - 1$$

Variables and units

Use compatible force, stress or other characteristic units and a consistent definition of applied factors. The chosen lower and upper bounds must not double-count uncertainty.

Example inputs

Synthetic allowable lower bound=150 kN; demand upper bound=100 kN; approved example factor=1.25; required example margin=0.10.

Calculation and checks

1. Factored demand=1.25×100=125 kN.
2. MS=150/125-1=0.20.
3. The result 0.20 is at least the example required 0.10.

Decision interpretation: The stated scalar margin passes its example predicate. Every other required load case and mechanism remains separately evaluated.

Validity limits: No factor or margin here is a universal structural design rule. Buckling, joints, thermal loads, dynamics, damage, fatigue and model validity may require distinct analysis and evidence.

ASTRA connections: 33.5; 65.1; 77

Scalar structural margin: approved factors still required

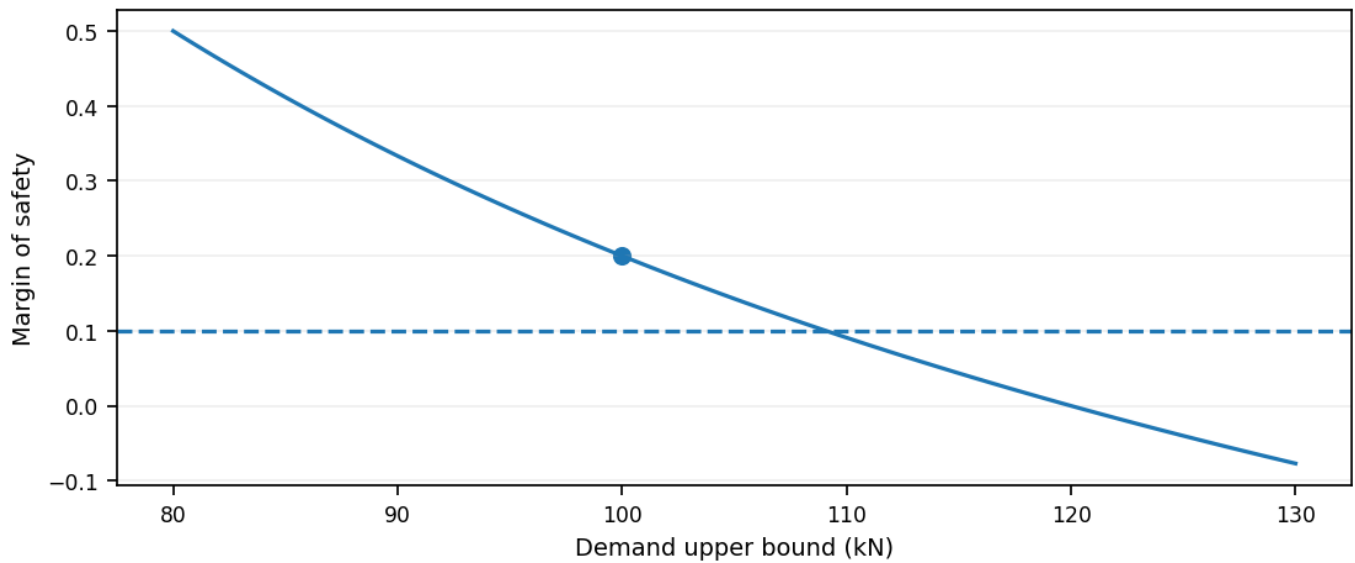


Figure Q18 — Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q19 Vibration spectral integration and units

Source: ASTRA Annex AM, Q19, page 218. All numerical inputs in this example are synthetic.

$$a_{\text{rms}}^2 = \int S_a(f) df$$

$$a_{\text{rms}} = \sqrt{a_{\text{rms}}^2}$$

Variables and units

S_a is acceleration power spectral density. With g^2/Hz and Hz , the integrated variance is g^2 . The specified conventional acceleration conversion is 9.80665 m/s^2 per g .

Example inputs

Synthetic flat PSD= $0.04 \text{ g}^2/\text{Hz}$ from 20 to 120 Hz; no content outside that illustrative band.

Calculation and checks

1. Bandwidth= $120-20=100 \text{ Hz}$.
2. Variance= $0.04 \times 100 = 4 \text{ g}^2$.
3. RMS= $\sqrt{4} = 2 \text{ g} = 19.6133 \text{ m/s}^2$.

Decision interpretation: The integration is correct for the stated flat spectrum. It does not define a test severity or establish qualification.

Validity limits: Real piecewise spectra, control methods, fixture dynamics, cross-axis behaviour, time duration and response limits require an approved profile. Do not integrate a logarithmic amplitude representation as though it were a linear PSD.

ASTRA connections: 42; Annex T; 77

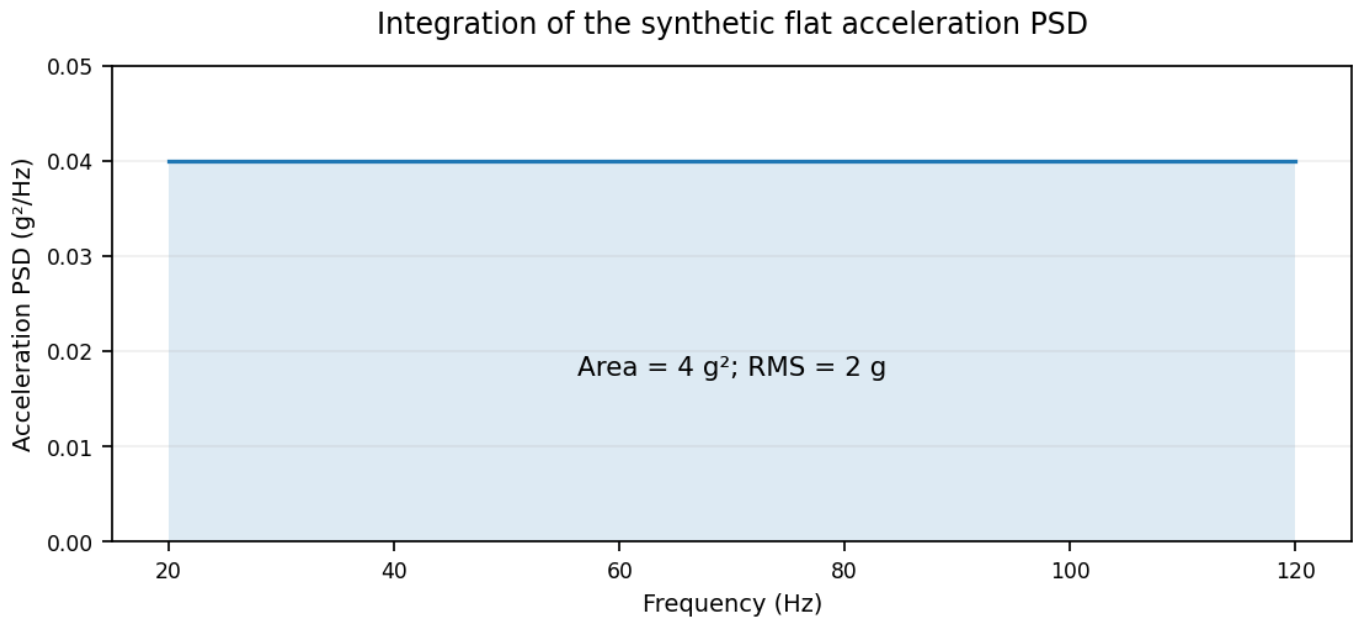


Figure Q19 – Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

AM.Q23 Material genealogy, yield and retained work

Source: ASTRA Annex AM, Q23, page 222. All numerical inputs in this example are synthetic.

Input = good + reject + tests + losses + work_in_progress

First-pass yield = accepted_first_pass_output/input

Variables and units

All quantities shall use a consistent lot and period. Recovered material remains linked to its origin and is not counted twice as new production.

Example inputs

Synthetic input=500 units; good first-pass=410; reject=30; destructive tests=10; process losses=20; work in progress=30.

Calculation and checks

1. Reconciliation=410+30+10+20+30=500 units.
2. First-pass yield=410/500=82%.
3. If 20 rejected units are later recovered, the recovery does not increase original input or first-pass output.

Decision interpretation: The quantity balance closes. Technical identity, condition and acceptance evidence still determine whether the 410 outputs are eligible.

Validity limits: A closed balance does not prove authenticity, completeness or material quality. Mixing quantities with different units or unverified scrap/recovery transfers invalidates the reconciliation.

ASTRA connections: 18.4; 48.4; Annex AC; 75.4

Original input reconciliation

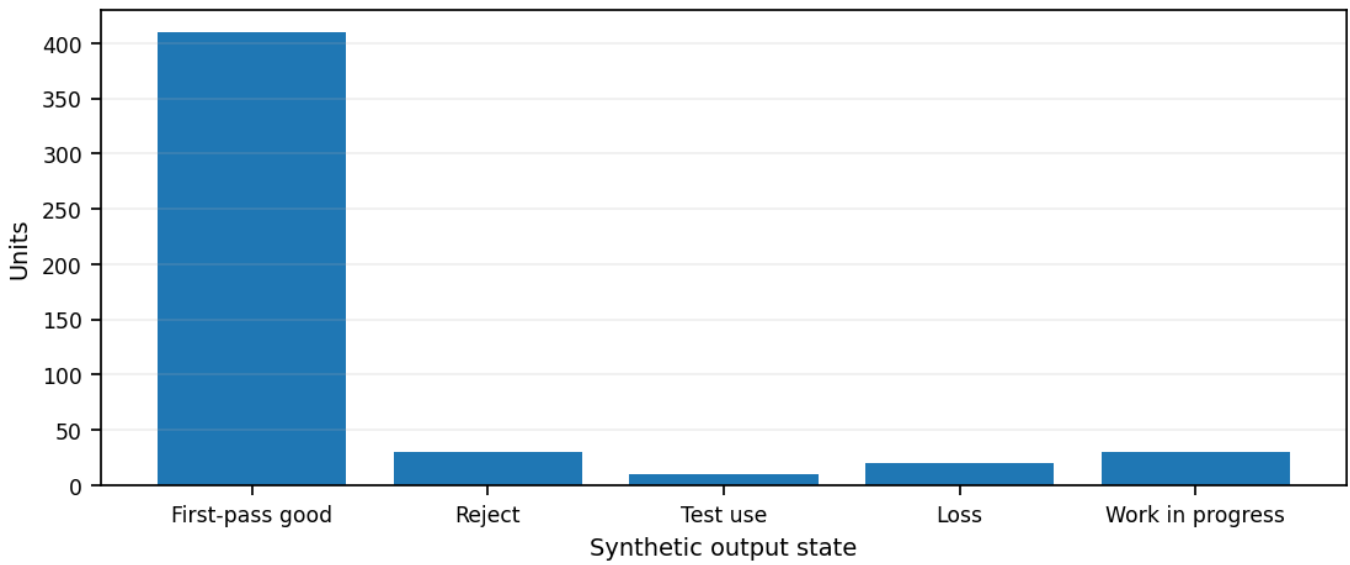


Figure Q23 — Synthetic visualisation. The axes and stated scenario define the quantity; no graph is an accreditation score, approved operating envelope or evidence of a real mission.

Local replay record: retain the actual input manifest, source versions, calculation version, unit checks, independent recomputation, expected/observed boundary results, limitations and decision authority. Do not overwrite the teaching inputs as though they were operational data.

E8 Adverse cases and independent replay

Challenge	Expected handling	Evidence retained
PR-004: Resolve every applicable domain – required basis missing	Unknown applicability is HOLD; absent equipment or budget never establishes N/A.	Original input, unresolved value, affected requirement and scope; named action owner.
PR-004: Approve exclusion and re-open triggers – handover or review incomplete	Only independently justified exclusions receive N/A; an unexamined consequential interface remains HOLD.	Expected and observed state; independent replay; correction/retest; receiving acknowledgement.
PR-005: Map competence to an actual task – required basis missing	A general title or training course is not an authorisation for an unfamiliar task.	Original input, unresolved value, affected requirement and scope; named action owner.
PR-005: Maintain event-time currency – handover or review incomplete	Later authorisation cannot validate prior out-of-scope work; assess affected earlier outputs separately.	Expected and observed state; independent replay; correction/retest; receiving acknowledgement.
PR-009: Define the method family technically – required basis missing	No unrelated technique is added because it shares a performer or report template.	Original input, unresolved value, affected requirement and scope; named action owner.
PR-009: Review change and corrective retest – handover or review incomplete	A fresh favourable run does not validate earlier affected output or automatically extend method scope.	Expected and observed state; independent replay; correction/retest; receiving acknowledgement.
PR-010: Freeze the quantitative contract – required basis missing	Invalid or missing essential inputs remain HOLD; the assessor does not supply an undocumented limit.	Original input, unresolved value, affected requirement and scope; named action owner.
PR-010: Replay and report independently – handover or review incomplete	Unresolved replay disagreement blocks the dependent acceptance even where the nominal arithmetic appears plausible.	Expected and observed state; independent replay; correction/retest; receiving acknowledgement.
PR-011: Design a purposeful validity programme – required basis missing	Participation alone is not satisfactory performance or demonstrated detection capability.	Original input, unresolved value, affected requirement and scope; named action owner.
PR-011: Close causes and historical extent – handover or review incomplete	New satisfactory performance restores only a bounded current capability after independent acceptance; old evidence is not rewritten.	Expected and observed state; independent replay; correction/retest; receiving acknowledgement.
PR-012: Reconcile output identity and basis – required basis missing	A report title or customer description cannot substitute for verified identity and scope.	Original input, unresolved value, affected requirement and scope; named action owner.

Challenge	Expected handling	Evidence retained
PR-012: Review publication against authority — handover or review incomplete	Every communicated result retains its actual event history and no unsupported broader scope.	Expected and observed state; independent replay; correction/retest; receiving acknowledgement.
PR-013: Separate evidence gap, technical failure and finding — required basis missing	HOLD is not proof of product failure, but a demonstrated control failure still needs an appropriate finding.	Original input, unresolved value, affected requirement and scope; named action owner.
PR-013: Close with prospective evidence — handover or review incomplete	No grant, renewal or extension with an open in-scope finding; later correction does not backdate earlier validity.	Expected and observed state; independent replay; correction/retest; receiving acknowledgement.

Before local reliance, also select every relevant AP01–AP48 challenge in the core. Keep fictional tests isolated from live credentials, commands and recipients. For each test define the requirement, precondition, expected response, execution steps, actual observations, evidence, defect consequence, correction, retest and acceptance. This publication supplies test designs and examples, not completed local validation records.

Appendix A – Controlling source requirements

The following text is reproduced from the supplied ASTRA FIRST EDITION. The clause identifier and page refer to that 248-page source. These excerpts and their evidence fields must be read with all triggered normative annexes. Newly authored implementation steps elsewhere in this document do not amend the core standard.

1.3 – Object and responsibility tuple

Source: AF-AST-STD-001, page 10.

Each application shall identify the responsible legal entity, actual performer, object type, family and module, sites and remote functions, configuration or programme version, lifecycle role, applicable period, criticality, profile and exclusions. Products, services, processes, people, supplier scopes, educational programmes, assessment providers and environmental statements are separate objects. A combined dossier may share evidence but shall provide a separate conclusion and status history for each claimed object. Where a duty is outsourced, the record shall identify both the performer and the organisation retaining accountability.

Required evidence: Complete scope tuple; separate requested outcomes; actual-performer map.

1.5 – Activity-based applicability

Source: AF-AST-STD-001, page 11.

The applicant shall make a reasoned applicability decision for every common and family requirement. Non-applicability requires the actual activity and retained responsibility to be absent, without undermining a claimed outcome. Small size, another certificate, customer nomination or outsourcing alone does not justify exclusion. A provider that changes from distribution to repair, or from laboratory testing to product certification, shall reassess its scope before making the broader claim. Technical reviewers shall approve material exclusions and record the supporting evidence.

Required evidence: Approved applicability matrix; technical rationale; review triggers and version history.

7.1 – Function-specific competence

Source: AF-AST-STD-001, page 17.

The operator shall define separate competence requirements for application review, audit leadership, specialist evaluation, sampling, laboratory sign-off, independent review, decisions and appeals. Profiles shall state technical fields, methods, criticality, language, professional judgement, evidence interpretation and access permissions. A person may hold several roles only when separately qualified and case independence remains valid. No generic aerospace assessor designation shall imply mastery of all eight families.

Required evidence: Role profiles; technical authorisation matrix; case coverage check.

7.3 – Essential steps and assessment security

Source: AF-AST-STD-001, page 17.

Knowledge and practical criteria shall be fixed before candidate evaluation. Every predesignated essential safety, integrity and independence step shall be passed; component scores shall not be averaged to conceal failure. Equivalent reassessment shall follow evidenced remediation and preserve earlier attempts. Examination questions, scenarios, identity checks and scoring shall be secured and validated. An automated score or AI recommendation shall not be the sole authority for a practical competence decision.

Required evidence: Assessment blueprint; component/essential-step results; secured attempts; independent authorisation.

7.4 – Initial assessor population

Source: AF-AST-STD-001, page 17.

Where no established ASTRA assessor population exists, at least two independent competent professionals shall assess each candidate against the stated role and technical criteria. Their own competence and conflicts shall be documented. Comparable prior work may satisfy specified experience elements only after verification; programme knowledge, witnessed performance and independence shall not be waived. Honorary titles, reciprocal self-approval and attendance at an introductory meeting shall not create assessor authority.

Required evidence: Initial-panel qualifications; equivalence map; witnessed task; remaining scope restrictions.

7.5 – Maintenance and inactivity

Source: AF-AST-STD-001, page 18.

Maintain relevant development, current practice and observed performance at the intervals in Annex D. Review poor reports, inconsistent decisions, complaints, new technologies and changes in methods as well as activity counts. Failure to meet the applicable role minimum shall suspend independent role use until reviewed supervised reactivation. An individual shall notify limitations and request support rather than accept a task outside the authorised scope. Restoration does not erase earlier affected-work concerns.

Required evidence: Practice/development logs; witnessed reviews; suspension and reactivation; prior-work assessment.

8.1 – Facility suitability and environmental control

Source: AF-AST-STD-001, page 18.

Work locations shall support the actual method, product, learner or service conditions. Identify and monitor relevant temperature, contamination, vibration, electromagnetic, access, lighting, space and utility constraints. Separate incompatible activities and protect articles and records. Temporary, mobile, customer-owned and remote facilities shall meet the same relevant suitability conditions. An adverse environmental excursion shall be linked to the work it could affect and shall not be closed merely by restoring room conditions.

Required evidence: Facility scope; environmental limits and logs; excursion/affected-work review.

8.2 – Equipment identity and fitness

Source: AF-AST-STD-001, page 18.

Equipment, software-controlled instruments, fixtures, tools and reference artefacts shall be uniquely identified and suitable for the required range, resolution, accuracy, uncertainty and duty. Verify acceptance before first use, after repair or configuration change, and when validity is questioned. Records shall include version, location, maintenance, checks, restrictions and status. Calendar calibration alone shall not establish fitness for every method or specimen. Out-of-service equipment shall be prevented from supporting an authorised result.

Required evidence: Equipment register; acceptance and checks; method suitability; restricted-use controls.

8.3 – Traceability and calibration

Source: AF-AST-STD-001, page 18.

Measurement results shall have a technically appropriate documented connection to accepted reference quantities or justified reference bases, with uncertainty contributions and competent calibration evidence. Verify the actual service range and result, not only the provider's logo. Where direct reference traceability is not technically possible, document the alternative reference, method validation and limitations. Do not claim metrological traceability from an unverified manufacturer declaration or a broken chain of comparisons.

Required evidence: Calibration chain; certificates/results; uncertainty contributions; justified alternative basis.

8.4 – Intermediate checks and due dates

Source: AF-AST-STD-001, page 19.

The responsible technical person shall set calibration and verification intervals using use, drift, environment, history, consequence and applicable requirements. Conduct intermediate checks where needed to detect loss of capability between calibrations. A due date shall not be extended retrospectively because capacity is unavailable. Any prospective interval change requires recorded technical evidence and approval. Checks shall challenge actual measuring functions rather than merely confirm that the equipment powers on.

Required evidence: Interval rationale; intermediate checks; prospective approved changes; actual-use status.

8.5 – Adverse equipment findings

Source: AF-AST-STD-001, page 19.

When equipment is damaged, out of tolerance, misconfigured or otherwise suspect, stop affected use and determine the last demonstrated valid state. Review prior results, associated lots, decisions and recipients, using the likely error mechanism and uncertainty. Recalibration restores equipment evidence only after acceptance; it does not by itself establish the validity of prior work. Amend or withdraw reports and notify affected parties when their conclusions are no

longer supported.

Required evidence: Quarantine; look-back interval; impacted results; corrected reports and notifications.

8.6 – Consumables, materials and reference items

Source: AF-AST-STD-001, page 19.

Control receipt, identity, condition, shelf or out-time, storage, preparation and permitted reuse of materials, standards, test specimens and consumables. Establish suitability and homogeneity/stability where reference items support method validity. Prevent contamination, substitution and expired material use. Externally supplied reference values shall be reviewed for intended use and uncertainty; a nominal value with unknown provenance shall not support an unjustified calibration or conformity conclusion.

Required evidence: Material/reference register; custody; validity and expiry; suitability review.

9.1 – Method selection and contract fit

Source: AF-AST-STD-001, page 19.

Before work, select a method suitable for the actual object, property, range, operating conditions and intended decision. Resolve contradictory or obsolete customer instructions and disclose methods outside demonstrated capability. The method shall define preparation, setup, execution, data treatment, acceptance and limitations sufficiently for competent reproducibility. A familiar method name shall not establish fitness for a new material, geometry, low-level concentration, digital system or service context.

Required evidence: Reviewed method request; authorised procedure; scope/range suitability; resolved ambiguities.

9.2 – Verification and validation

Source: AF-AST-STD-001, page 19.

Verify established methods in the actual implementation. Validate new, non-standard or materially modified methods for the intended use, addressing relevant bias, precision, selectivity, sensitivity, range, robustness and uncertainty. Establish acceptance criteria before validation data are assessed. Retain failed trials and restrictions. Method transfer between sites, instruments, software or personnel requires evidence that material performance remains valid; a shared procedure number does not demonstrate successful transfer.

Required evidence: Validation/verification plan; raw results; acceptance analysis; transfer and limitation records.

9.3 – Sampling and specimen integrity

Source: AF-AST-STD-001, page 20.

When sampling is within scope, establish the population, selection method, sample size, locations, conditions, randomisation where relevant, transport and preparation. Address sampling contributions to uncertainty and limitations of inference. A result from a client-selected item shall identify that boundary. Sample identity and chain of custody shall survive splitting, pooling, consumption and subcontracting. Reject or condition work on unsuitable specimens before interpreting the result as representative.

Required evidence: Sampling plan; population and selection; custody; deviations and restricted inference.

9.4 – Measurement model and uncertainty

Source: AF-AST-STD-001, page 20.

Evaluate uncertainty appropriate to the reported result and decision. Identify measurand, significant corrections, input distributions, sensitivity coefficients, dependence, sample preparation and environmental effects. The calculation shall distinguish standard and expanded uncertainty, coverage factor, units and coverage interpretation. Known material bias shall be corrected or explicitly handled through an approved model, not hidden in a convenient uncertainty allowance. A result shall not inherit an uncertainty copied from an unrelated calibration capability.

Required evidence: Uncertainty budget; corrections; covariance; units; coverage and applicability justification.

9.5 – Decision rules and boundary results

Source: AF-AST-STD-001, page 20.

Agree the decision rule before evaluation and record its treatment of false acceptance, false rejection, uncertainty and criticality. Annex G sets the full-interval rule and alternative-rule controls. Conformity demonstrated, nonconformity demonstrated and indeterminate are separate outcomes under that rule. Indeterminate work remains held from acceptance pending valid disposition. Repeating observations until one passes, rounding a borderline value into compliance or changing the specification after seeing the result is not a valid resolution.

Required evidence: Pre-agreed rule; unrounded inputs; outcome; hold and authorised disposition.

9.6 – Continuing validity and comparisons

Source: AF-AST-STD-001, page 20.

Maintain a planned programme of internal controls and independent or interlaboratory comparison appropriate to each significant technical field. Participation alone is not satisfactory performance. Investigate adverse results, assign causes and assess prior reports. Where a suitable comparison is unavailable or impracticable, approve a technically justified alternative with evidence of challenge and limitations; lack of participation opportunity shall not be described as external proof of competence. Review coverage as methods and volumes change.

Required evidence: Validity-monitoring plan; comparison results; justified alternatives; adverse-result actions.

9.7 – Technical reporting and amendments

Source: AF-AST-STD-001, page 20.

Reports shall identify issuer, client, actual item, scope, method/version, conditions, dates, results, units, uncertainty where needed, deviations, decision rule, conclusion, limitations and authorised signatory. Identify subcontracted results and opinions separately. A report shall not imply that untested characteristics or future production were examined. Amendments shall preserve the original, state the reason and affected conclusion, and reach recipients who relied on an incorrect result.

Required evidence: Attributable report; raw-data linkage; subcontracted-result identity; amendment and recipient log.

11.3 – Existing evidence and reuse

Source: AF-AST-STD-001, page 22.

Review prior reports, approvals and certificates for authenticity, issuer competence, actual method, site, period, conditions and configuration. Identify precisely which requirement and decision use they support and what remains to be evaluated. Include adverse results and restrictions. Another outcome shall not be declared equivalent solely from a similar title or scope label. Evidence reuse may reduce repeated document requests but cannot remove necessary local implementation, witnessing or independent decision.

Required evidence: Reuse matrix; authenticity/scope checks; residual gaps; controlled access to original evidence.

12.3 – Method-family witnessing

Source: AF-AST-STD-001, page 23.

Group methods only when common principles, equipment, competence, ranges and failure mechanisms justify representativeness. Witness each distinct method or capability family, including material extremes and high-consequence tasks. A single demonstration shall not cover unrelated techniques merely because one employee performs them. Include the whole relevant task from preparation and identity through data interpretation and reporting. Map any unobserved part to valid supplementary evidence or exclude it from the granted scope.

Required evidence: Witnessing plan; family grouping rationale; observed limits; supplementary evidence.

13.3 – Witness control

Source: AF-AST-STD-001, page 25.

Record the actual task, date, site, equipment, software, personnel, conditions, method version and acceptance basis. Observe essential steps directly where required and prevent coached performance from being misrepresented as routine independent work. Controlled simulation is acceptable only where the profile justifies its fidelity and restrictions. Live work shall not be made unsafe to create a demonstration. A missing essential observation requires supplementary evidence, reassessment or restricted scope, not a presumed pass.

Required evidence: Witness log; essential steps; simulation validity; unobserved-step disposition.

13.5 – Closing and report

Source: AF-AST-STD-001, page 25.

Communicate evidence-based findings, affected scope, immediate protection and the distinction between team recommendation and final decision. Acknowledge factual corrections without erasing valid adverse evidence. Issue the final evaluation report within 14 calendar days of evaluation closure; exceptional delay shall be explained without moving an already notified finding clock. The report shall state actual time, methods, samples, sites, witnesses, criteria, limitations, findings and recommendation.

Required evidence: Closing record; findings and original notification dates; final actual-coverage report.

14.1 – Finding formulation and classification

Source: AF-AST-STD-001, page 25.

A finding shall identify the exact requirement and version, objective evidence, gap, affected object/site/period and classification rationale. Use critical, major, minor and observation categories as defined in Annex G. An observation is not a substitute for a demonstrated failure. Several local failures may together establish systemic breakdown. Determine technical containment separately from administrative grade so that an immediate hazard is not delayed by debate over wording.

Required evidence: Requirement–evidence–gap record; classification; extent and protective decision.

14.2 – Immediate protection and notifications

Source: AF-AST-STD-001, page 25.

Upon a credible critical concern, the responsible organisation shall protect people and affected work immediately, preserve evidence and notify required recipients. A holder shall notify its operator within 24 hours of awareness; earlier applicable duties remain. On a substantiated critical concern, the operator shall suspend the affected status or impose an effective evaluated restriction within 24 hours. An independent duty function with a pre-existing mandate may act urgently, followed by prompt independent review.

Required evidence: Awareness and action times; containment; notification/acknowledgement; status decision.

14.3 – Occurrence, escape and systemic extent

Source: AF-AST-STD-001, page 26.

The organisation shall determine why the problem occurred and why existing controls did not prevent or detect it. Identify affected and potentially affected outputs, sites, learners, reports, suppliers and configurations, including those already delivered. Test causal explanations with evidence. Training, a revised procedure or blaming an operator alone is not sufficient where workflow, capacity, interface, equipment or management conditions contributed. Preserve rejected hypotheses and material uncertainty.

Required evidence: Population trace; tested causes; occurrence/escape controls; systemic review.

14.4 – Plans, closure and effectiveness

Source: AF-AST-STD-001, page 26.

Submit a corrective-action plan within 30 calendar days of finding notification. Verify major closure within 60 days and minor closure within 90 days, while immediate protection remains separate. Define effectiveness criteria and observation exposure before closing. Review changes for unintended effects. A new finding number, changed owner, amended report or rescheduled plan shall not restart the original clock. Missed deadlines trigger the affected status action in Annex H, not an automatic extension.

Required evidence: Accepted plan; original due dates; implementation and effectiveness evidence; verified closure.

14.5 – Existing status and new grants

Source: AF-AST-STD-001, page 26.

Initial grants, renewals and extensions require closure of every in-scope nonconformity. An existing status may continue with a local minor only after adequate protection, reviewed cause and extent, accepted plan and a reasoned independent conclusion that essential controls remain intact. A major compromising ongoing conformity requires suspension, unless an independently demonstrated unaffected scope can be restricted. A future promise of correction is not present

competence.

Required evidence: Independent continuation/restriction rationale; closed findings for grant; current protection.

19.1 – Detailed technical scope

Source: AF-AST-STD-001, page 31.

The laboratory or inspection body shall define method families, materials/items, measured properties, ranges, conditions, sites, mobile activities and limitations. Calibration scopes shall state measurement quantities and demonstrated uncertainty capability. Inspection scopes shall state object, stage, criteria and independence relationship. An unrestricted description such as all aerospace tests is insufficient. Flexible scope shall be bounded prospectively and shall not authorise a new measurement principle, site or technical field without competence review.

Required evidence: Method/range/site schedule; relationship declaration; controlled flexibility limits.

19.2 – Responsible technical management

Source: AF-AST-STD-001, page 31.

Appoint technical managers and authorised signatories with demonstrated competence for their actual methods and conclusions. Record who approves methods, performs work, interprets results, releases reports and evaluates complaints. Shared staff shall have manageable workloads and substitution arrangements. Independence required by the claimed result shall be demonstrated structurally and in practice. Laboratory staff shall be able to stop work and refuse an unsupported result without commercial retaliation.

Required evidence: Technical appointments; signatory scope; workload/deputies; stop-work authority.

19.3 – Method performance and detection

Source: AF-AST-STD-001, page 32.

Demonstrate method suitability for relevant defect mechanisms or measurands, specimen preparation, surfaces, geometry, matrix effects, interference, access and environmental conditions. For qualitative inspection, evaluate false-positive and false-negative behaviour where material. Detection capability shall be tied to technique, task, equipment and person. A successful reference check on an easy artefact shall not prove the ability to detect every relevant defect in an installed structure.

Required evidence: Method validation; challenge specimens; detection limitations; authorised interpretation.

19.4 – NDT-specific competence

Source: AF-AST-STD-001, page 32.

NDT work shall identify technique, material/product sector, equipment, procedure and acceptance basis, with qualified task personnel and technical supervision. Establish training, experience, practical demonstrations, vision or physical requirements only where justified by the task, periodic re-examination and employer authorisation. Industrial qualification shall not be equated with a general personnel badge. Hazardous-source use requires separate lawful authorisation and safe operating arrangements; this standard supplies no source-handling or exposure instructions.

Required evidence: NDT role/technique matrix; practical evidence; employer authority; controlled safety permissions.

19.5 – Materials and destructive testing

Source: AF-AST-STD-001, page 32.

Control sampling location, specimen geometry, orientation, machining/preparation, conditioning and traceability to parent material. Demonstrate relevant apparatus performance, rate/control conditions, data acquisition and result processing. Record invalid tests, fractures or anomalies and the reason for any retest. Chemical and physical methods shall address relevant contamination, blank, recovery, reference-material and calibration effects. A result shall be limited to the actual specimen and justified population inference.

Required evidence: Specimen-parent links; conditions; raw data; validity and retest disposition.

19.6 – Calibration and reference capability

Source: AF-AST-STD-001, page 32.

Calibration shall report the actual quantity, range, method, conditions, result, corrections and uncertainty with suitable traceability. Scope capability shall be supported by a technically complete uncertainty budget and demonstrated implementation. Where an external calibration supports another method, verify that its uncertainty and range are sufficient for the intended use. A scope schedule shall not advertise a smaller uncertainty than the body can actually achieve under the stated conditions.

Required evidence: Calibration scope; uncertainty evidence; reference chain; demonstrated capability.

19.7 – Sampling and customer-supplied items

Source: AF-AST-STD-001, page 32.

Contract review shall establish who sampled the item and which population is represented. At receipt, verify identity, condition, deviations, quantity and requested work. Resolve unsuitable or ambiguous items before work; where proceeding is justified, state limitations in the result. Maintain storage, preparation, transport, consumption and disposal records. A customer's unverified description shall be clearly identified rather than silently adopted as a laboratory observation.

Required evidence: Receipt and custody; sampling responsibility; deviations; report limitations.

19.8 – Inspection relationships

Source: AF-AST-STD-001, page 32.

Identify whether inspection is independent third-party activity or is performed within a declared ownership, design, production or service relationship. Assess the risks and required separation for the actual claim; do not imply third-party independence when it is absent. Separate inspected-work responsibility from inspection judgement sufficiently to meet the agreed independence requirement. Internal inspection may support technical evidence, but it shall not be relabelled as an independent certification of that work.

Required evidence: Relationship analysis; independence controls; accurately worded report and scope.

19.9 – Inspection judgement and remote methods

Source: AF-AST-STD-001, page 33.

Inspection procedures shall specify acceptance criteria, technique, access, sampling, instruments, records and the competence needed for judgement. Record inaccessible features and limitations of visual, remote or automated methods. Drone imagery, digital scans and AI classification shall be validated for their intended inspection purpose. Absence of an observed defect does not demonstrate absence of a defect outside the method's detection or access capability. Escalate uncertain classifications before release.

Required evidence: Inspection plan; method validity; access/detection limits; reviewed judgement.

19.10 – Comparisons and validity programme

Source: AF-AST-STD-001, page 33.

For each significant technical field, define risk-based reference checks, blind or duplicate work, comparison participation and other validity controls. Before granting a new scope, examine available satisfactory comparison evidence or an independently accepted alternative that directly challenges the claimed ability. No arbitrary score shall compensate for unresolved poor performance. Record investigation, affected historical work and successful corrective verification. Programme enrolment alone shall not be counted as a satisfactory result.

Required evidence: Validity coverage map; comparison/alternative results; investigations; restored capability.

19.11 – Nonconforming laboratory or inspection work

Source: AF-AST-STD-001, page 33.

A designated person shall evaluate the significance of nonconforming work, stop or restrict it, assess prior results, notify affected clients where necessary and authorise resumption only after correction is demonstrated. The response shall address method, equipment, personnel, environment and data mechanisms. A corrected report shall identify what changed and why. Do not erase an adverse report merely because a new sample gives a better result.

Required evidence: Nonconforming-work record; prior-report assessment; amended reports; resumption authority.

19.12 – Technical witnessing for accreditation

Source: AF-AST-STD-001, page 33.

The accrediting team shall witness representative activities for every distinct method family or inspection capability and examine a complete application-to-report trail. Include adverse work, authorised sign-off, uncertainty, outsourced results and subsequent controls. Similar-method grouping requires a written technical rationale. An organisational audit with no relevant technical observation is not a completed laboratory or inspection competence evaluation. The final scope shall match the actual demonstrated capability, locations and limitations.

Required evidence: Witness coverage; complete case trail; independent scope review; accreditation decision.

25.1 – Activity-specific provider controls

Source: AF-AST-STD-001, page 42.

A provider shall identify each assessment activity, legal responsibility, scheme/profile, methods, resources and final decision authority. Certification and verification bodies shall demonstrate their full application-to-decision process in addition to supporting technical evaluations. Personnel and external experts shall meet role-specific criteria. Requested activities lacking actual demonstration remain outside scope. The activity labels in Annex I are routing labels, not additional family counts or proof of external standing.

Required evidence: Provider activity schedule; legal/technical responsibility; complete representative process.

25.2 – Management-system certification

Source: AF-AST-STD-001, page 42.

System-certification activity shall use competent audit teams, scope review, appropriate readiness and implementation evaluation, validated time and site planning, findings, independent review and decision, and continuing surveillance. The certifying body shall retain final decision responsibility and control outsourced audit work. It shall not certify a system it designed or use a consultancy relationship to secure the result. An audit report or training certificate is not itself a management-system certificate.

Required evidence: Audit-route dossier; independence; final retained decision; surveillance.

25.3 – Product, process and service certification

Source: AF-AST-STD-001, page 42.

Define the relevant conformity model: instance evaluation or continuing family/service/process scope. Verify object identity, representative technical evidence, production or delivery controls where ongoing, sampling and decision rules. Separate qualification, routine acceptance and certification. The body shall demonstrate competence in the actual evaluation methods and scope, not rely on an organisational auditor alone. Labels and surveillance shall match the chosen model.

Required evidence: Technical model; representative evaluation; continuing controls; precise certification scope.

25.4 – Personnel certification

Source: AF-AST-STD-001, page 43.

Maintain a validated job/task profile, fair prerequisites, secure and representative knowledge/practical assessment, independent decision, credential scope, continued competence, renewal and appeal. Training and examination relationships shall not compromise independence. Essential practical failure blocks the relevant credential regardless of total score. Employer task authority and statutory privileges remain separate. Apply the relevant AF 9100 personnel provisions when that route is claimed; other profiles shall not silently alter them.

Required evidence: Role scheme; assessment validity/security; independent result; continuing competence and boundaries.

25.5 – Validation and verification bodies

Source: AF-AST-STD-001, page 43.

Demonstrate competence for the type of claim, sector, data, methodology, assurance level and intended use. Separate preparation of a client's statement from independent evaluation of it. Verify engagement acceptance, strategic analysis, risk and materiality, evidence plan, execution, misstatement resolution, independent review and conclusion. Preserve actual statement versions and communicate later material errors. Accreditation concerns the body's competence, not the

truth of every statement it may issue.

Required evidence: Claim-specific competence; independent engagement trail; statement version; conclusion and correction.

25.6 – Proficiency and reference-material activities

Source: AF-AST-STD-001, page 43.

A body organising proficiency exercises or producing reference material requires a separately released technical profile. That profile shall cover competence, planning, assigned values or property characterisation, homogeneity/stability, uncertainty, participant/sample confidentiality, statistical methods, reporting and validity. These functions shall not be inferred from ordinary laboratory accreditation. Until the specialised profile and witnesses are complete, the catalogue shall show the requested activity as development, not granted scope.

Required evidence: Dedicated profile; characterisation/statistical basis; valid specialised witnessing; bounded status.

28.1 – Mandatory scope content

Source: AF-AST-STD-001, page 45.

Each outcome shall state holder and responsible issuer, unique identifier, exact class, family/module, criteria and version, evaluated object, site, technical activity, conditions/ranges, configuration or delivery version, period, decision/issue dates, status and restrictions. Identify ongoing expiry or instance boundary appropriately. The scope schedule forms part of the outcome and shall be available for verification without disclosing protected technical detail. Annex I supplies the minimum schema.

Required evidence: Decision-linked scope schedule; claim class; criteria/version; public/private split.

41.2 – Integrated route and hidden characteristics

Source: AF-AST-STD-001, page 62.

The production route shall identify every process stage, branch, handover and external performer that can affect a required characteristic. Essential variables shall include relevant preparation and downstream treatment, not only the main machine cycle. Qualification shall cover representative materials, geometry, equipment, software, personnel and environmental conditions. Final inspection shall not be assumed capable of detecting all latent process defects. The route shall preserve failed runs, rework and technical restrictions through product acceptance.

Required evidence: Route and dependency map; qualification matrix; essential variables; hidden-property rationale; original run history.

42.1 – Requirement-led test strategy

Source: AF-AST-STD-001, page 63.

The organisation shall select inspection, analysis, demonstration or testing according to the requirement and intended decision. The plan shall identify the actual article, configuration, environment, acceptance criterion, method, instrumentation, uncertainty, competent personnel and protective arrangements. Qualification, production acceptance, workmanship screening and research shall be distinguished. A catalogue of tests shall not be treated as a complete verification programme until every applicable requirement and material interface has an adequate method and evidence path.

Required evidence: Requirement-to-method matrix; test purpose; article/configuration identity; approved criteria and safety review.

42.2 – Test tailoring and representativeness

Source: AF-AST-STD-001, page 64.

Test conditions shall be derived from the actual technical and obligation basis. The organisation shall explain specimen geometry, material condition, mounting, fixtures, boundary conditions, input locations, operating modes and differences from the deployed article. Similarity arguments shall identify relevant differences and failure mechanisms. Tailoring, reduced exposure or substitution of analysis shall have prospective technical approval. No universal vibration level, temperature, radiation dose, acoustic spectrum or electromagnetic severity is imposed by this standard.

Required evidence: Tailoring rationale; environment definition; specimen and fixture review; approved deviations and retained limitations.

42.3 – Combined environments and test sequence

Source: AF-AST-STD-001, page 64.

The verification strategy shall evaluate whether environmental stresses interact and whether the order of exposure affects the conclusion. Cumulative damage, preconditioning, repairs, software changes and prior unsuccessful tests shall remain part of the article history. The organisation shall distinguish necessary qualification margin from unrepresentative over-test. Where separate tests cannot demonstrate a coupled effect, an additional integrated method or justified analysis shall be established. A passed individual test shall not automatically bound every combination of operating conditions.

Required evidence: Sequence and interaction analysis; article exposure history; cumulative-effect review; additional integrated evidence.

42.4 – Data acquisition, uncertainty and protective limits

Source: AF-AST-STD-001, page 64.

Instrumentation and software shall be suitable for the required range, bandwidth, accuracy, synchronisation and uncertainty. The organisation shall retain original data, transformations, calibration and configuration evidence. Technical acceptance and safety-stop criteria shall be specified separately. An interruption, missing channel or unexpected protective action shall be recorded and assessed before restart. Restoring the test setup shall not establish that the article remains representative or that the interrupted evidence supports the intended conclusion.

Required evidence: Measurement-chain dossier; raw data; uncertainty and timing; stop/restart records; article-validity review.

42.5 – Failure, retest and independent judgement

Source: AF-AST-STD-001, page 64.

Failed, invalid and indeterminate results shall remain identifiable with their original conditions. A retest shall follow an approved technical rationale and account for selection effects, changed articles, repairs and repeat exposure. The organisation shall not test repeatedly until a favourable result appears or revise acceptance criteria after seeing the data. The independent reviewer shall examine coverage, adverse evidence and limitations. Any product concession shall remain separate from a conformity claim that requires the original criterion to be fulfilled.

Required evidence: Failure and validity classification; retest rationale; original/revised configuration; independent acceptance or hold.

42.6 – Laboratories and complete reports

Source: AF-AST-STD-001, page 64.

Testing shall use demonstrated method-specific competence, suitable facilities, traceability and continuing-validity controls. Reports shall identify actual performer, article, method/version, conditions, deviations, results, uncertainty where relevant, decision rule and supported conclusion. Subcontracted data and opinions shall be distinguishable. A laboratory competence outcome does not approve every tested product, and an article qualification does not accredit the laboratory. The final report shall expose untested characteristics and restrictions on inference to a broader family.

Required evidence: Laboratory scope and validity; complete test report; subcontractor identity; independent review and limited inference.

54.4 – Occurrence, escape and affected population

Source: AF-AST-STD-001, page 79.

Investigation shall examine both why an event occurred and why existing controls failed to prevent or detect it. The organisation shall preserve original evidence, competing explanations and uncertainty. Population tracing shall include already delivered products, services, reports and decisions that share relevant causes. Replacing a person or issuing training shall not alone close a systemic weakness in work design, resources, interfaces or measurement. Later correction shall not be backdated to legitimise earlier unsupported work.

Required evidence: Occurrence/escape analysis; population and dependency trace; tested causes; historical impact and recipient action.

57.1 – Role-specific competence and scope

Source: AF-AST-STD-001, page 81.

The operator shall map actual assessment tasks to verified discipline, method, language, consequence and judgement requirements. Audit leadership, technical evaluation, independent review, decisions and appeals shall remain separate authorisations. Learning attendance and numerical experience minima shall not replace observed ability. A person competent in one method or programme shall not be assigned unrestricted aerospace authority. The case plan shall identify necessary specialists and limits before accepting the work.

Required evidence: Task-to-role and person matrix; verified entry evidence; observed performance; bounded authorisation.

57.3 – Practical assessment and maintained practice

Source: AF-AST-STD-001, page 82.

Knowledge and practical criteria shall be defined before evaluation. Essential safety, integrity and independence steps shall be separately passed. Mentored work shall identify what the candidate actually performed and what remained supervised. Continuing development, recent practice, observed performance and review feedback shall maintain the authorisation. Unmet minima or loss of currency shall suspend independent role use until the required supervised reactivation. Later renewal shall not validate prior work performed outside authority.

Required evidence: Blueprint and attempts; mentored-work records; continuing practice; suspension/reactivation; historical impact review.

62.1 – Atomic requirement record

Source: AF-AST-STD-001, page 88.

Each assessed requirement shall have a stable identifier, one accountable owner, an applicability trigger, defined object and configuration, required behaviour or characteristic, observable conditions, verification method and acceptance predicate. Compound statements shall be separated into individually testable rows without deleting any condition. Terms such as adequate, suitable, promptly or representative shall be resolved through the explicit records in this clause before they support an acceptance decision.

Verification: Inspect each requirement row and its linked method, boundary and predicate.

Acceptance / hold rule: Every applicable row is evaluable without inventing an object, limit, observation or decision role. Unresolved essential terms result in HOLD.

62.2 – Mandatory parameter completion

Source: AF-AST-STD-001, page 88.

An application-dependent value shall be entered in a controlled parameter schedule before the relevant test or evaluation. Each entry shall state symbol, meaning, unit, inclusive or exclusive bounds, uncertainty treatment, operating modes, technical derivation, source evidence, approver and change trigger. A declared value is not adequate merely because the applicant selected it. The independent reviewer shall challenge whether it bounds the claimed environment and consequence.

Verification: Recalculate derivations and check mission, interface and obligation coverage.

Acceptance / hold rule: The complete parameter set is approved prospectively. A blank, TBD, unsupported factor or undefined threshold blocks the dependent release.

62.3 – Evidence validity before conformity

Source: AF-AST-STD-001, page 88.

The evaluator shall first determine whether evidence belongs to the correct object, configuration, period, method and authorised performer and whether it is usable for the intended inference. Only valid relevant evidence shall enter a conformity predicate. Rejected, corrupted, missing, unobservable or wrong-version evidence shall remain identified. Evidence may be valid and show failure; an invalid test is not a valid pass or a valid proof of product failure.

Verification: Check provenance, configuration, method capability, original data and uncertainty separately from result classification.

Acceptance / hold rule: Validity is established before PASS or FAIL is assigned; otherwise use HOLD with an explicit invalidity or evidence-gap reason.

62.4 – Four requirement states

Source: AF-AST-STD-001, page 88.

A requirement state shall be PASS, FAIL, HOLD or N/A. PASS means the approved predicate is satisfied by valid evidence. FAIL means valid evidence demonstrates that the predicate is not satisfied. HOLD means applicability, method, evidence, uncertainty or authority is not sufficiently resolved. N/A means the trigger and retained responsibility are absent and independent approval of that exclusion is recorded. Missing equipment, budget, access or time shall not justify N/A.

Verification: Execute the truth table in Annex AL using actual scope and evidence.

Acceptance / hold rule: Exactly one current state is assigned with reason and traceable evidence. All earlier states are retained.

62.5 – No compensation or favourable default

Source: AF-AST-STD-001, page 89.

A positive conformity decision shall require PASS for every applicable mandatory requirement, closure of every in-scope nonconformity, valid independent competence and actual authority. N/A rows shall have approved reasons; HOLD and FAIL rows shall not contribute a favourable default. Weighted scores, averages, majority votes, programme membership or good results in another discipline shall not compensate for an unmet condition.

Verification: Reconcile the complete requirement population with the decision dossier; test missing and negative cases.

Acceptance / hold rule: The Boolean conjunction in Annex AL is true. Otherwise no positive grant, renewal or extension is permitted.

62.7 – Decision replay and consistency

Source: AF-AST-STD-001, page 89.

A decision shall be reproducible from the same frozen requirements, parameter values, original evidence, calculation version, uncertainty model and role assignments. Two competent reviewers reaching different results shall identify the differing input, predicate, assumption or expertise before closure. Interpretation records may clarify a term but shall not change limits after results are known. Equation inputs shall retain unrounded values.

Verification: Independently replay a selected boundary case and reconcile every difference.

Acceptance / hold rule: The replay produces the same supported state, or the case remains HOLD pending a controlled technical resolution.

63.1 – Domain selection without geographic omission

Source: AF-AST-STD-001, page 90.

The mission owner shall assess every domain in Annex AK and record applicable, not applicable or not yet determined. The scope shall include terrestrial preparation, launch and recovery interfaces as well as the in-space activity. Earth orbit, cislunar and libration-region operations, solar and planetary missions, small bodies, ocean-world exploration and interstellar precursor concepts shall not be excluded solely because they differ from conventional satellite operations.

Verification: Compare the mission concept and responsibility map with all Annex AK domain rows.

Acceptance / hold rule: Every domain has a reasoned disposition. Any unassessed domain that can affect a required outcome remains HOLD.

63.3 – Environment, phase and mode matrix

Source: AF-AST-STD-001, page 90.

For each applicable domain, define mission phase, operating mode, intended duration, exposure, interfaces, repairability, accessible evidence and credible degraded states. Include dormant storage, transport, separation, commissioning, routine service, communication outage, servicing, retirement and loss-of-mission conditions when relevant. A qualification for one phase shall not automatically cover another phase with different loads, resources or observability.

Verification: Review the complete phase-by-mode matrix and its verification links.

Acceptance / hold rule: Every safety-, mission- or claim-relevant cell has accepted evidence or an explicit restriction; no essential unexamined cell is passed by analogy.

63.6 – Interface and lifecycle closure

Source: AF-AST-STD-001, page 91.

The scope shall include relevant upstream and downstream duties, including supplied design data, ground services, communications, receiving facilities, environmental custody and long-term records. Transfers shall identify the sender, receiver, evidence and acceptance. A contractor delivering one subsystem shall not be made responsible for unrelated mission duties, but an integrator shall not exclude duties it retains because they are performed by others.

Verification: Trace each interface to an accountable performer and retained owner.

Acceptance / hold rule: No essential responsibility, evidence handover or terminal obligation is orphaned.

64.2 – Geometry, reference frames and event time

Source: AF-AST-STD-001, page 92.

Trajectory- and geometry-dependent information shall identify frame origin, orientation, epoch, time scale, units, state covariance and transformation version. An exchanged position or orientation shall not be accepted without enough

metadata to transform it consistently. Surface-relative, body-fixed, inertial and local engineering coordinates shall remain distinct. Event time, receipt time and ground processing time shall not be merged.

Verification: Recompute selected transformations and challenge wrong-frame and stale-epoch inputs.

Acceptance / hold rule: Transformations meet the approved error and time bounds; incompatible or ambiguous metadata produces HOLD.

64.5 — Heritage and similarity

Source: AF-AST-STD-001, page 92.

A heritage argument shall compare actual design, materials, manufacturing source, mission exposure, software, interfaces and life history. Identify unchanged evidence, invalidated evidence and new demonstration. Successful service of a related design shall be accepted only for characteristics and mechanisms it actually supports. Lack of a recorded failure shall not prove performance of an unmonitored critical characteristic.

Verification: Review a difference matrix and trace each retained conclusion to applicable original evidence.

Acceptance / hold rule: Every material difference has a technical disposition and sufficient evidence before the new claim is accepted.

65.6 — Payload function and scientific or service output

Source: AF-AST-STD-001, page 95.

Payload requirements shall identify intended outputs, calibration, dynamic range, contamination sensitivity, pointing or timing needs, processing and delivered data quality. Instrument performance, system suitability and scientific interpretation are separate conclusions. Changes in compression, processing or calibration shall retain raw or reconstructable data and algorithm identity. Marketing resolution or accuracy figures shall state the tested conditions and limitations.

Verification: Reconstruct selected output products from identified inputs, calibration and processing.

Acceptance / hold rule: Output criteria are met for the stated domain; unsupported scientific or service claims are not inferred from a functioning instrument.

67.3 — Receipt, execution and completion

Source: AF-AST-STD-001, page 98.

The record shall distinguish command prepared, approved, transmitted, received, accepted, started, completed, failed and unknown. A transmission log or acknowledgement shall not be treated as verified physical completion. Completion criteria shall identify telemetry or other evidence, timing, confidence limits and independent checks needed for the actual action.

Verification: Trace a command through its full event and evidence history.

Acceptance / hold rule: Only evidence satisfying the approved completion predicate supports completed status; missing terminal evidence remains unknown or partial.

73.1 — Population, mission and human tasks

Source: AF-AST-STD-001, page 110.

Define intended occupants, roles, mission duration, environmental conditions, physical access, workload, communication and reasonable variation in users. Identify essential tasks and protective actions. Validation shall state participant representativeness, assistance, training and limitations; one expert demonstration shall not establish capability for all users.

Verification: Review the user/task matrix and representative normal and degraded validation.

Acceptance / hold rule: Each essential task is demonstrated under its approved conditions; unsupported populations and tasks are excluded from the claim.

73.5 — Human factors and effective authority

Source: AF-AST-STD-001, page 111.

Displays, alerts and procedures shall identify state, urgency, limitations and required actions without ambiguous mode or priority. Workload, fatigue, interruptions, language, delayed feedback and automation bias shall be evaluated. A manual override is an effective control only when a person has the information, time, training and physical or technical ability to use it.

Verification: Observe representative task and intervention performance, including misleading and degraded information.

Acceptance / hold rule: Every essential response passes independently; aggregate usability scores do not offset a failed protective task.

74.6 – Anomalies, unknown state and release of information

Source: AF-AST-STD-001, page 113.

Loss of containment indication, unverified seal condition, missing samples or unexplained contamination shall trigger preservation, restriction and qualified review. Do not equate absent alarms with demonstrated integrity. Technical data and scientific interpretations shall retain limitations; public statements shall not imply a sample is harmless or pristine solely because its custody form is complete.

Verification: Examine anomaly decisions, actual observations and bounded reporting.

Acceptance / hold rule: Only supported technical conclusions are released; uncertainty and unresolved protection duties remain visible.

75.3 – Essential variables and remote monitoring

Source: AF-AST-STD-001, page 114.

The qualified envelope shall identify influential variables, combinations, tolerances, monitoring performance and reaction rules. Retain actual variable histories, interruptions and sensor gaps by output identity. Remote telemetry shall support acceptance only for properties and mechanisms demonstrated to be observable or validly inferred. A successful process command does not prove the intended material transformation occurred.

Verification: Review representative qualification, sensor/model validation and raw production history.

Acceptance / hold rule: All required variables and output characteristics are supported; an unobservable essential property requires additional evidence or a restricted outcome.

77.2 – Campaign design and article pedigree

Source: AF-AST-STD-001, page 118.

Define qualification articles, flight or service articles, specimens, representative differences, prior exposure, fixtures, operating modes and cumulative test sequence. Identify which conclusions may be transferred between articles and why. Failed tests, repairs and substitutions shall remain in the same historical chain.

Verification: Review specimen-to-product and test-to-configuration equivalence records.

Acceptance / hold rule: All material differences and accumulated effects are evaluated before evidence reuse; unrepresentative essential evidence is not accepted.

77.3 – Measurement and uncertainty readiness

Source: AF-AST-STD-001, page 118.

Before execution, verify instrument identity, calibration, range, bandwidth, synchronisation, environment, software, raw-data retention and uncertainty suitability. Sensor placement and spatial coverage shall represent the characteristic being accepted. Protect the article and personnel through separately specified stop conditions.

Verification: Inspect the full measurement chain and execute relevant readiness checks.

Acceptance / hold rule: All required channels are valid for the intended inference; a missing, saturated or misconfigured critical channel prevents that acceptance.

77.5 – Original data and invalid tests

Source: AF-AST-STD-001, page 118.

Retain actual setup, input and response histories, environmental conditions, interruptions, alarms, raw files, corrections, uncertainty and validity classification. An invalid run shall state what evidence remains usable and which requirement is not demonstrated. A repaired or changed article shall not silently replace the originally failed configuration.

Verification: Reconstruct a selected run from raw data and contemporaneous records.

Acceptance / hold rule: The run is independently interpretable and no failed, invalid or missing evidence is concealed.

77.6 – Numerical and attribute acceptance

Source: AF-AST-STD-001, page 119.

Quantitative decisions shall use the prospectively selected predicate and uncertainty rule. Attribute decisions shall name observable states and essential steps rather than unstructured judgement. Equality at an inclusive limit is handled as specified; empty acceptance regions, invalid units and non-finite values produce HOLD. Rounding shall not change an outcome.

Verification: Replay boundary, negative and missing-input cases using Annex AL and Annex AM.

Acceptance / hold rule: The correct state follows deterministically from valid unrounded inputs and the approved predicate.

77.7 – Retest and corrective verification

Source: AF-AST-STD-001, page 119.

Retest shall follow an approved rationale, defined scope and representative configuration. It shall preserve the original failure and address causal, exposure and selection effects. Repeated trials until a pass occurs are not an acceptance strategy. Corrective verification shall include the original failure mode and relevant regression, not merely a new favourable measurement.

Verification: Review the retest authorisation, all attempts and failure-to-correction trace.

Acceptance / hold rule: The original deficiency and affected requirements are demonstrably resolved; otherwise the claim remains failed or held.

77.8 – Independent campaign closure

Source: AF-AST-STD-001, page 119.

The final dossier shall reconcile configuration, criteria, valid results, adverse evidence, untested characteristics, uncertainty, concessions and open duties. Qualification, article acceptance, laboratory competence and ASTRA conformity shall retain separate decisions. A technical concession shall not be relabelled as fulfilment of the original criterion.

Verification: Perform independent requirement-by-requirement closure with actual decision authority.

Acceptance / hold rule: Every applicable gate for the exact claimed object passes; counts, percentages or programme completion dates alone cannot release the object.

78.4 – Human authority and consequential decisions

Source: AF-AST-STD-001, page 120.

Human oversight shall be validated against available information, response time, competence, workload and control access. Automated decision support may organise evidence but shall not independently issue an ASTRA grant, renewal, suspension or restoration. Generated observations and citations shall not be presented as authentic source events.

Verification: Challenge automation bias, false-source and delayed-intervention scenarios.

Acceptance / hold rule: Actual authorised people can perform every required role and source evidence remains verifiable; nominal oversight alone is insufficient.

79.4 – Affected populations and historical decisions

Source: AF-AST-STD-001, page 122.

An event shall be traced to affected configurations, fleet members, materials, methods, software, personnel, reports and prior decisions. Determine both occurrence and escape causes and test competing explanations. Changing a supplier, restarting a service or training one person shall not by itself close a shared systemic cause.

Verification: Inspect end-to-end dependency and look-back analysis with actual notifications.

Acceptance / hold rule: All materially dependent outputs are addressed; no valid adverse history is erased by later correction.

80.1 – One complete application schedule

Source: AF-AST-STD-001, page 124.

The schedule shall join the object tuple, F01–F08 selection, Annex AK domains, phase/mode matrix, required methods, parameter records, competence, evidence, independent decisions and continuing controls. All triggers in Annex AO shall be resolved. Shared records may be reused after relevance review, but shall not merge distinct objects, outcome classes or actual authority.

Verification: Reconcile the full schedule with Clauses 1, 4, 62 and 63 and Annex C.

Acceptance / hold rule: No essential scope, parameter, responsibility or evidence field remains undefined before a positive decision.

80.2 – Domain and verification completeness

Source: AF-AST-STD-001, page 124.

Map every applicable domain and requirement to valid verification and to an accountable conclusion. Treat domain counts, test counts and completed checklist percentages as planning measures only. Annex T is not exhaustive of all future methods; a newly discovered material mechanism shall create a controlled additional requirement and evidence task before the affected claim proceeds.

Verification: Perform forward and reverse traceability and inspect omitted-domain reasons.

Acceptance / hold rule: Every applicable condition passes or has a justified approved N/A; no HOLD or FAIL is hidden by a coverage percentage.

80.3 – Competent independent closure

Source: AF-AST-STD-001, page 124.

The independent reviewer shall have verified technical coverage, lawful evidence access and no prohibited case relationship. Technical dissent shall be resolved by evidence, corrected scope or further work. Where a three-person panel is required, all three eligible members shall participate and the established vote rule shall apply only after the technical gates are satisfied.

Verification: Check competence, conflict, access, panel and reasoned decision records.

Acceptance / hold rule: Both the technical conjunction and applicable authority/panel rules pass; a vote cannot cure absent evidence.

80.4 – Bounded claim and publication

Source: AF-AST-STD-001, page 124.

The outcome shall identify legal holder, issuer, object, configuration, family/module, domain, site or remote responsibility, criteria, limitations, actual dates and ongoing or instance basis. Public wording shall not imply unrestricted coverage of all space, universal safety, statutory permission or external recognition without evidence. The approved cover and edition label do not change those boundaries.

Verification: Compare the actual decision with credential, registry and all proposed public representations.

Acceptance / hold rule: Published scope and status exactly match the authorised decision and preserve every material restriction.

Appendix B — Local adoption, validation and receiving acceptance

Gate	Required evidence	Outcome when incomplete
Authority and identity	Actual operator, scoped mandate, permissible result class, named owner, independent decision and remedy functions.	No live scope release.
Requirement population	All applicable clauses and annexes mapped to child conditions, with reasons and independent approval for exclusions.	HOLD the affected conclusion.
Parameters and methods	Prospective values/attributes; technical basis; valid methods; representativeness; calibration, uncertainty and approved predicates.	No dependent acceptance.
People and evidence	Current demonstrated competence; conflict clearance; original usable source evidence; actual configuration and event times.	Reassign or obtain sufficient evidence.
Local tools and tests	Actual deployment tested with positive, boundary, missing, invalid and prohibited inputs; original failed cases retested.	No consequential reliance on unaccepted tools.
Independent closure	Every mandatory requirement PASS, approved N/A, all in-scope nonconformities verified closed, panel rules where required.	No grant, renewal or extension.
Claims and continuity	Decision-linked scope/status; source history; genuine custody, receiving access, retention, urgent notices and terminal duties.	Restrict publication or transfer until resolved.

Record authentic approval and activation in AF-AST-FR-001 and AF-AST-SC-004 or an equivalent controlled record. The edition label is not an effective date for a particular case. Preserve historical decisions under their actual controlling basis; a newer document does not retroactively create missing competence or evidence. Source: Clauses 4, 31, 61, 62 and 80; Annexes P and AR.

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