

Jackson Aerospace Quality Clauses

JAI1 – Manufacturer’s Certificate of Conformance

A copy of the manufacturer's Certificate of Conformance must be provided with shipment. Certificate of Conformance must include the manufacturer’s name, part number ordered, lot number or traceable number, quantity, and signature. Chain of Traceability from manufacturer to Jackson Aerospace is required.

JAI2 – Test Report/Chemical and Physical Certifications

Manufacturer Test Reports are required and must include: Material Certifications, Chemical Analysis, Test Results, and Process Certifications. Chain of traceability from manufacturer to Jackson Aerospace is required.

JAI3 – Counterfeit Products

The seller shall ensure that only new and authentic materials are used in products delivered to Jackson Aerospace. The seller may only purchase parts directly from Original Component Manufacturers (OCM), or OCM franchised distributors. Use of product that was not provided by these sources is not authorized unless first approved by Jackson Aerospace.

The seller shall maintain a method of item traceability that ensures tracking of the supply chain back to the manufacturer of all Electrical, Electronic, and Electromechanical (EEE) parts included in assemblies and subassemblies being delivered per this order.

This traceability method shall clearly identify the name and location of all of the supply chain intermediaries from the manufacturer to the direct source of the product for the seller and shall include the manufacturer's batch identification for the item(s) such as date codes, lot codes, serializations, or other batch identifications. Specify supply chain traceability to the OCM that identifies the name and location of all the supply chain intermediaries from the part manufacturer to the direct source of the product for the seller.

Seller also shall meet requirements of DFAR 252.246-7007: Contractor Counterfeit Electronic Part Detection and Avoidance Systems. Authorized distributors shall disclose if they are not authorized for the EEE parts they are supplying.

JAI4 – Specialty Metals Requirements

******DFARS 252.225-7009 COMPLIANCE STATEMENT MUST BE INCLUDED******

Any specialty metals included in any articles delivered under this purchase order must comply with that clause, and DFARS 252.225-7009 must be flowed down to all vendors supplying any articles delivered under this purchase order that include specialty metals. Each shipment shall be accompanied by a signed supplier certificate of conformance which certifies compliance to this clause.

JAI5 – Mercury Free Certification

A mercury free certification must accompany all shipments to Jackson Aerospace on this purchase order. The mercury free statement may be made directly on the Test Report/Certificate of Conformance or may be a separate certification. The statement shall certify that, during the manufacturing process, material furnished on the above purchase order did not come in contact with mercury or its compounds, or any mercury containing devices with a single boundary of containment. Failure to provide this certification will delay acceptance and payment.

JAI6 – Shelf Life

Supplier shall provide original manufacturing/cure date, lot number(s), and the shelf-life expiration date (or state if expiration date is indefinite or unlimited). The supplier shall physically identify the shelf-life expiration date on the deliverable product or the unit packaging according to the applicable standard. In addition, any special storage/handling instructions shall be forwarded. Elastomeric material with “No Shelf Life” requirement or “Unlimited Shelf Life” shall be marked as such. Material must have no more than 25% of its shelf life expired when delivered.

JAI7 – First Article Inspection

First Article Inspection (FAI) shall be performed in accordance with the requirements of AS9102: Aerospace First Article Inspection requirement per the revision level established at time of purchase order issuance. Where product does not meet the intent of "first production run" as defined within AS9102, 100% of all product characteristics shall be inspected. If the supplier already has FAI documentation on file for the same part number and configuration of product noted in the purchase order and is still compliant with AS9102 for partial or accomplishment, a new FAI is not required.

JAI8 – Part Markings

Supplier shall mark all deliverable products as required by the purchase order, engineering drawing, and manufacturing planning. Unless otherwise stated in the engineering requirements, the Supplier shall apply the date of manufacture, date code(s), or other control identifier numbers (DOM, serial number, lot number, control number, heat lot number, final inspection date, batch number, casting number, and/or work order number) to all deliverable hardware.

When two or more parts are joined in an assembly, manufacturing and inspection records shall identify each part by part number, revision, and, if applicable, examples of traceable information as outlined below.

Parts and materials shall be traceable to ingredients, raw material, manufacturing, and inspection records. Hardware produced in lots, batches, groups, etc., shall be traceable by control information applied. When size of hardware or supplier's automated stamping process does not permit data application to individual hardware, the information shall be similarly placed on bags, tags, or labels as applicable. The supplier may determine lot size unless otherwise specified in the purchase agreement or design document. Examples of traceable information may include, but are not limited to:

- Date of manufacture
- Serial number
- Lot number
- Control number
- Heat lot number
- Final inspection date
- Batch number
- Casting number
- Work order number

JAI9A – Northrop Grumman Approved Processors – Aeronautic Systems

At the time of Purchase Order release, process specifications called out in either engineering drawings, other process specifications, or purchase orders require NG-SSSD approval when they are listed in **Northrop Grumman Approved Special Processors List (ASPL)** under the Aeronautics Systems division. Suppliers shall ensure that the processing source performing the work is approved and listed on the Aeronautics Systems ASPL for that process specification prior to processing of each lot of hardware. Suppliers shall validate this by reviewing the ASPL whenever they receive a new Purchase Order or whenever they begin processing a new lot of hardware. The NG-SSSD ASPL can be found at the following link: <https://oasis-aspl.myngc.com>. A Certificate of Conformance to the process specification requirements shall be provided with the shipment. Using an unapproved processor will be cause for rejection.

JAI9B – Northrop Grumman Approved Processors – Strategic Space Systems

At the time of Purchase Order release, process specifications called out in either engineering drawings, other process specifications, or purchase orders require NG-SSSD approval when they are listed in **Northrop Grumman Approved Special Processors List (ASPL)** under the Strategic Space Systems division. Suppliers shall ensure that the processing source performing the work is approved and listed on the Strategic Space Systems ASPL for that process specification prior to processing of each lot of hardware. Suppliers shall validate this by reviewing the ASPL whenever they receive a new Purchase Order or whenever they begin processing a new lot of hardware. The NG-SSSD ASPL can be found at the following link: <https://oasis-aspl.myngc.com>. A Certificate of Conformance to the process specification requirements shall be provided with the shipment. Using an unapproved processor will be cause for rejection.

JAI10 – Counterfeit

The supplier shall have documented processes appropriate to the organization and the product for the prevention of counterfeit or suspect counterfeit part use and their inclusion in product(s) delivered to Jackson Aerospace. Counterfeit part prevention processes shall include: training of appropriate persons in the awareness and prevention of counterfeit parts; application of a parts obsolescence monitoring program; controls for procuring product from original or authorized manufacturers, authorized distributors, or other approved sources; requirements for assuring traceability of parts and components to their original or authorized manufacturers; verification and test methodologies to detect counterfeit parts; monitoring of counterfeit parts reporting from external sources; quarantine and reporting of suspect or detected counterfeit parts. For electrical/electronic/electro-mechanical (EEE) parts, the supplier shall have a counterfeit detection process that meets SAE standard AS5553: Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition. All parts delivered and/or used in the manufacture of deliverable products shall be traceable to the Original Component Manufacturer (OCM), Original Equipment Manufacturer (OEM), or authorized/franchised distributors.

JAI11 – Software Requirements

Supplier shall establish and maintain a Software Quality Assurance (SQA) program in accordance with the applicable purchase order or contractual requirements. Additionally, a pre-contract Qualification Survey will be performed if needed.

JAI12 – Counterfeit Detection System

Additional Terms and Conditions, government items: the provisions of DFARS 252.246-7007 (DOD Contracts): “Contractor Counterfeit Electronic Part Detection and Avoidance System” and DFARS 252.246-7008: “Sources of Electronics Parts” are incorporated herein and shall apply to the line item or line items indicated in the order text. The requirements contained in DFARS 252.246-7007 and DFARS 252.246-7008 apply to electronic component parts.

JAI13 – Test Data

When Buyer specification requires test data to be recorded during performance of acceptance testing, a copy of the recorded data, showing evidence of Seller’s inspection and verification of conformance, shall accompany shipment of items to Buyer. Data shall meet the format requirements of Buyer specification, and as a minimum, be identified with:

- Buyer’s procurement document number and applicable change notice number
- Buyer’s specification/drawing number and revision letter
- Buyer’s engineering order(s)
- Part number
- Type of test performed
- Lot number, serial numbers, and/or codes of items tested
- Total quantity tested, quantity accepted, and quantity rejected
- Any codes, keys, or other information necessary to interpret Seller’s data

JAI14 – Inspection Reporting Requirements

Seller shall submit one copy of an inspection report reflecting 100% inspection verification of all drawing characteristics for all products with each shipment of items. An AS9102 checklist or equivalent supplier form may be used to capture the inspection report, provided that all elements of those forms are included. The report shall delineate each drawing characteristic and specify the corresponding actual measurement results, with the exception that a check mark will suffice for those dimensions with a total tolerance spread greater than 0.005 inch. For part dimensions with defined tolerances, the report shall delineate each drawing characteristic with the corresponding actual measurement results for the first and last part produced when hardware is produced via CNC machining or automated processing setup. For items machined/manufactured under non-CNC or operator dependent processing, where the processing can vary from unit to unit, actual measurements shall be reported for part dimensions with defined tolerances on all units in the order. 100% verification for 100% of the parts is required on all threaded features, including non-locking inserts. The report shall include the type of measurement equipment and a unique identifying number of actual equipment used for the inspection.

JAI15A – Prohibited Material

All constructions and finishes containing pure cadmium or pure zinc are prohibited. In addition, constructions and finishes containing pure tin are prohibited unless they contain a minimum of 3 weight percent lead. The use of lead-free solder alloys is not acceptable unless approved by the Buyer. (Note: Sn96/Ag4, Sn95/Sb5, and Au80/Sn20 are acceptable when indicated in Buyer specifications, or Buyer approved Process Identification Documents [PID]).

If the final deliverable item contains metallic components which are encapsulated and cannot be tested for Prohibited Material in the final deliverable configuration of the item (e.g. motor/resolver (i.e. 2BXXX), harmonic drive (i.e. 5ZXXX), or heat pipe assembly (i.e. CXXXXXX)), the Seller shall ensure Buyer approved Elemental Composition Testing (i.e., XRF or EDS), capable of providing quantitative accuracy sufficient to preclude prohibited material, is performed on the individual metallic components prior to assembly. The elemental composition test results shall be included with the final deliverable item for shipment to the Buyer.

Note: The requirement for test results is not applicable when the supplier is providing discreet Destructive Physical Analysis (DPA) or Prohibited Material samples as indicated on the Purchase Order.

Seller shall submit, with each shipment of items, a Certificate of Conformance verifying that all material and/or finishes used to construct the deliverable item are free from prohibited materials (i.e. pure cadmium, pure zinc, and pure tin [less than 3 weight percent lead]), the Purchase Order number, the item description, and the part number.

JAI15B – Prohibited Material (Pure Cadmium, Pure Zinc, Pure Tin – No Testing)

All constructions and finishes containing pure cadmium or pure zinc are prohibited. In addition, constructions and finishes containing pure tin are prohibited unless they contain a minimum of 3 weight percent lead. The use of lead-free solder alloys is not acceptable unless approved by the Buyer. (Note: Sn96/Ag4, Sn95/Sb5, and Au80/Sn20 are acceptable when indicated in Buyer specifications or Buyer approved Process Identification Documents [PID].)

JAI15C – Prohibited Material (Tin Only – No Testing)

All constructions and finishes containing pure tin are prohibited unless they contain a minimum of 3 weight percent lead. The use of lead-free solder alloys is not acceptable unless approved by the Buyer. (Note: Sn96/Ag4, Sn95/Sb5, Au80/Sn20 are acceptable when indicated by Buyer specifications, or Buyer approved Process Identification Documents [PID].)

JAI16 – Northrop Grumman 2372A30

“Northrop Grumman, General Specification for Power/Control Systems Navy Nuclear Procurement 2372A30, latest revision applies.”

Seller shall include all provisions of this Article, including this sentence, in all sub-tier contracts under this order. Any inability or unwillingness of a sub-tier supplier to comply with this provision should be documented in writing and submitted to the Prime Contractor.

JAI17 – Manufactured to Latest Revision

Parts shall be manufactured to the current revision of the standard part drawing in effect at the time of purchase order placement or later revision.

JAI18 – Control of Common Commodities

This procurement falls under Boeing's Federal Aviation Administration (FAA) issued Production Certificate and/or Boeing's customer, the US Government, and quality system supplier control program as applicable.

Part(s) and/or material under this contract shall be Original Equipment Manufacturer (OEM) parts. Unless explicit contractual direction is given to the contrary, no articles (or constituent parts thereof) ordered by Buyer shall contain any Federal Aviation Administration-Parts Manufacturer Approval (FAA-PMA) markings and the accompanying paperwork (e.g. packages, shippers, etc.) shall not contain any FAA-PMA markings.

JAI19 – D1-4426 Approved Process Source

Seller and/or Seller's subcontract process sources shall be an approved processor or shall use approved processors as required by D1-4426: "Approved Process Sources." A list of the approved processors and associated processes are available from Buyer's Procurement Agent or at: <http://active.boeing.com/doingbiz/d14426/index.cfm>.

This clause shall be included in Seller's subcontracts for work performed under this purchase contract that involves D1-4426 processes. The Seller's purchasing information shall conform to the purchasing data requirements of D1-4426 Appendix D. These purchasing data requirements can be found at:

<http://active.boeing.com/doingbiz/d14426/Appendix-D.pdf>

JAI20 – Raw Material Test Results

(a) Seller shall include with each shipment the raw material manufacturer's test report (i.e. mill test report) that states that the lot of material furnished has been tested, inspected, and found to be in compliance with the applicable material specifications.

(b) When the material specification requires quantitative limits for chemical, mechanical, or physical properties, the test report shall contain the actual test and/or inspection values obtained. For aluminum mill products (except castings), certifications for chemistry may indicate compliance within the allowed range. Certifications for physical properties shall show actual values.

JAI21 – High Strength Fastener Certification

Seller will include with each shipment a legible copy of the manufacturer's certification. The certification will include the following information:

- (a) Name and address of the manufacturer
- (b) Part number and the specifications that controlled the manufacture of the goods
- (c) Manufacturer's production order/lot number
- (d) Raw material data
 - (1) Material specification
 - (2) Alloy class, type, or grade
 - (3) Raw material heat lot number
 - (4) Name of raw material producer
- (e) Chemical analysis report
- (f) Mechanical test report as defined by the applicable specification (e.g. tensile and/or single/double shear strength)
- (g) Metallurgical examination report as defined by the applicable specification (e.g. microstructure and/or macrostructure)

JAI22 – Acquisition and Use of Foreign Metallic Raw Material

Approved non-domestic metallic raw material producers for Industry and Government specifications (i.e. AMS, ASTM, MIL, and QQ etc.) are listed in the Qualified Products List (QPL) of DMS 2201: Procurement From Foreign Sources-Metallic Raw Materials.

SELLER FURNISHED MATERIAL CERTIFICATION

Seller shall document and maintain material certification containing the following:

- 1. Description of the material used in the manufacture of the end-item
- 2. Material specifications
- 3. Lot, heat, or batch number identification
- 4. Source of procurement (Name, Address, and Country)
- 5. Origin of material
- 6. Name and location of the melting facility
- 7. Name and location of mill
- 8. Mill certification, and
- 9. All other requirements as specified in the applicable raw material specification including chemical and physical analysis.

JAI23 – Material Substitution Prohibition

A. Unauthorized Material Substitution (General)

Unauthorized material substitutions are not permitted on Buyer's Goods.

B. Metallic Materials (Specific)

Temper or Condition Conversion – unless specifically authorized by the engineering definition, conversion of a raw material (i.e. heat treat to change the temper or condition of the material) constitutes material substitution of the condition provided by the manufacturer.

Metallic Raw Materials – Buyer's engineering drawings may refer to obsolete or superseded specifications covering several forms, thicknesses, widths, etc. of the alloy or alloys. The required characteristics of these materials are defined not only by the objective test standards of the specification, but by the processes/methods by which this final form is achieved.

Seller shall ensure that metallic materials covered by current or obsolete/superseded specifications are produced using the standard industry practices designed strictly to produce stock to the specified thickness, diameter, width or cross-sectional area, achieved by thermo-mechanical processing or casting process. Chemical, electrochemical, and mechanical methods used for the removal of surface scale or contamination, or the production of the required surface finish, in accordance with the material specification are acceptable raw material certifications for material or parts shall reflect the form and size of the raw material as originally manufactured by the raw material producer.

C. Specification Supersession:

For government specifications and standards canceled after June 1994, Seller and subcontractors at all tiers shall use the last active revision of the canceled specification and standard until an acceptable replacement is included in the requirements of this Contract.

D. Reports (Full Pedigree from melt to final product):

Raw material certifications shall show clear traceability to the manufacturer(s) of the raw material including ingot source, all thermo-mechanical processing (i.e. forging, rolling, drawing, etc.), heat treatment, chemical processing, and inspections, as required by applicable raw material specification requirements.

E. Chain of Custody (Disguising intermediate ownership):

Suppliers shall not disguise the pedigree of material or chain of ownership by removal of a previous supplier's name, nomenclature, or identification.

JAI24 – Product Certification 700

This procurement falls under Boeing's Federal Aviation Administration (FAA) issued Production Certificate 700 quality system supplier control program.

Unless explicit contractual direction is given to the contrary, no articles (or constituent parts thereof) ordered by Boeing Commercial Airplanes shall contain any Federal Aviation Administration-Parts Manufacturer Approval (FAA-PMA) markings and the accompanying paperwork (e.g. packages, shippers, etc.) shall not contain any FAA-PMA markings. Boeing requires that the provisions/requirements set forth above, as determined by the Seller to be applicable, be included in Seller's direct supply contracts as well as the obligation that they be flowed to the sub-tier supply chain.

JAI25 – Counterfeit Electronic Parts Detection

Contractor shall implement a counterfeit EEE parts detection and avoidance system and shall include the substance of this article, including this flow down requirement, in all contracts for EEE parts.

JAI26 – Markings

Contractor shall mark each individual item and applicable documentation (i.e. test report, shipping report, or certificate) to show clear traceability to lot number, heat lot number, or batch number.

JAI27 – High Strength Fastener Test Report

Contractor shall include with each shipment a legible copy of the Material Test Report. The report shall include the following information:

- Name and address of the manufacturer
- Part number and the ordering and procurement specification, including revision levels that controlled the manufacture of the goods
- Manufacturer's production order/lot number
- A copy of the Raw Material Certificate from the original manufacturer
- Raw material data: Material specification. Alloy class, type, or grade. Raw material heat lot, lot, or melt number. Name of raw material producer. Chemical analysis report.
- Mechanical test report as defined by the applicable specification (i.e. tensile and/or single/double shear strength, fatigue testing). Metallurgical examination report as defined by the applicable specification (e.g. microstructure and/or macrostructure).
- NDT test results: dye penetrate or magnetic particle results, when required by applicable specification. Dimensional inspection results. Heat Treatment Certification, when required by the applicable specification.

JAI28 – ESD Packaging

Ensure that any special handling information needed to preserve the integrity of the product being shipped (e.g. ESD, moisture sensitive, cleanliness) is clearly labeled on the exterior of the package and stated in the appropriate shipping documentation.

JAI29 – Special Process Certification

General Requirements

Certain special processes are required to comply with the Subcontract/Purchase Order (PO). Special processes shall be performed only by sources that have been surveyed and qualified/approved by the subcontractor and/or JPL to perform those processes. The subcontractor shall provide to JPL upon request all documentation showing evidence of special processor qualification and/or certification to perform special manufacturing, assembling, and test processing as required by the Subcontract/PO. The subcontractor may elect to use only JPL-approved sources.

Reporting Requirements

A special process certification shall be provided with each shipment of item(s) delivered per the Subcontract/PO. Special process certifications may be in supplier format and shall include the following:

- JPL's Subcontract/PO number
- Part number(s)
- Serial and/or lot numbers of the hardware processed (if applicable)
- Material process specification & revision
- Objective evidence demonstrating compliance with the applicable process (i.e. temperature charts and hardness test results for heat treatment, destructive test results, etc.)
- A certificate stating the special process was performed per applicable drawing/specification requirements.
- Subcontractor's name and address
- When the special processor is other than the subcontractor, provide a certificate of compliance from the special processor stating the special process was performed per applicable drawing/specification requirements. Certificates must include the processor's name, address, and be signed and dated by a company official. Each certificate must be signed and dated by the subcontractor authorized representative and/or processor attesting to the acceptance of the processes performed to the required specification(s).
- The subcontractor shall retain all records associated with the selection and approval of supplier-approved special process providers. Per the Subcontract/PO or regulatory agency requirements, these records shall be made available to JPL and/or regulatory agencies upon request. The subcontractor shall notify JPL prior to destruction of records relative to this Subcontract/PO.
- The subcontractor shall insert the substance of this clause, including this sentence, in all lower-tier subcontracts for work performed under the Subcontract/PO.

Information:

Special Processes are (including but not limited to): plating, anodizing, welding, soldering, polymeric applications, cleaning, wire bonding, ultrasonic inspection, radiographic inspection, high-voltage assemblies, ESD protection.

Electrical, Electronic, Electromechanical (EEE) Requirements:

In addition to the General Requirements, if the product is an EEE device, the subcontractor shall comply with the following requirements:

- Unless otherwise specified on the Purchase Order/Subcontract, discrete EEE components **shall** be packaged such that each individual component is isolated from contact with other components in the shipment; parts shall not be shipped using bulk packaging. Component tubes/rails are permitted to allow component contact as long as the component leads/terminations are isolated from inter-component contact.
- For non-ESD Sensitive EEE devices, subcontractor shall place them in conductive or static-dissipative packages, tubes, carriers, etc. for shipment. ESD-warning label is **optional**.
- For ESD Sensitive EEE devices, subcontractor shall place them in conductive or static-dissipative packages, tubes, carriers, etc. for shipment in accordance with ANSI/ESD S20.20. ESD-warning label is **mandatory**.
- If the device has an ESD sensitivity of **200 volts or less**, the subcontractor shall additionally identify the level of sensitivity on the packaging.

JAI30 – Prohibited Additive Manufacturing:

Subcontractors shall not use additive manufacturing to fabricate any parts unless specifically called out on the Subcontract/Purchase Order, JPL drawing, or Statement of Work.

JAI31 – NADCAP Approved Processor

Subcontractor performing special process shall be NADCAP accredited throughout the time of Subcontract/Purchase Order.

JAI32 – One Lot of Material Only

Only one lot number of material is allowed per line, per part number. No multiple lot numbers allowed.

JAI33 - 252.225-7052 Restriction on the Acquisition of Certain Magnets, Tantalum, and Tungsten

Except as provided in paragraph (c) of clause 252.225-7052, the Contractor shall not deliver under this contract any covered material melted or produced in any covered country, or any end item, manufactured in any covered country, that contains a covered material.

The Contractor shall insert the substance of clause 252.225-7052, including this paragraph (d), in subcontracts and other contractual instruments that are for items containing a covered material, including subcontracts and other contractual instruments for commercial items, unless an exception in paragraph (c) of this clause applies. The Contractor shall not alter this clause other than to identify the appropriate parties.

JAI34 - First Article per AS9102

First Article Inspection (FAI) shall be performed in accordance with the requirements of AS9102 as per the revision level established at time of purchase order issuance and the following requirements:

- FAI shall be performed prior to product acceptance.
 - Where product does not meet the intent of “first production run” as defined within AS9102, 100% of all product characteristics shall be inspected.
- FAI shall be completed to the ordered part number.
- Include On Form 3, include the verification of all measurable features/characteristic requirements outlined in all specifications.
- Include and account for all drawing notes that are applicable to the FAI report part number.
- Ensure discrepancies and nonconformances discovered during the FAI are documented and dispositioned by the appropriate Material Review Board and track corrective action to closure as described in AS9102.
- For custom/modified off-the-shelf assemblies and sub-assemblies, only the modification is subject to FAI. Commercial off-the-shelf product is not subject to FAI.

If the supplier has FAI documentation on file for the same part number and configuration of product noted in the purchase order and has been completed within the last 24 months, a new FAI is not required.

Supplier shall provide the completed FAI documentation to Jackson Aerospace at the time of part shipment.

JAI35 – Record Retention

Records shall be retained for a period of not less than seven (7) years from completion of the purchase order. Records are to be maintained utilizing the supplier's documented procedure and provided to Jackson at no cost.

Records shall include, but not be limited to:

- Evidence of inspection to assure adherence to applicable drawings or specifications and revisions
- First article inspection report
- Test reports
- Periodic inspection and control of inspection media
- Records to indicate control of Special Tooling and Special Test Equipment
- Test data records of all qualification and acceptance test performed
- Certification of personnel as required by specification and/or contract
- Raw material and process certifications
- Material review reports
- Or any other record in the realization, verification, or validation processes