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ERICKSON SPECIFICATION: **ES2003**

TITLE: **CONTROLLED ITEM PART REQUIREMENTS FOR 214 B/B-1 AND ST**

PREPARED BY:

DocuSigned by:
David G Miller
2C378B7243C5481...

DATE 07-08-2021 | 7:23 PDT

DAVID G. MILLER
LIAISON SPECIALIST

REVIEWED BY:

DocuSigned by:
J Johnson
472B1E2A0CF9437...

DATE 07-08-2021 | 9:16 PDT

JEFF JOHNSON
SENIOR MANAGER OF DESIGN AND OBSOLETE PARTS

APPROVED BY:

DocuSigned by:
William Johnson
A2B90D5026794A8...

DATE 07-08-2021 | 9:02 PDT

WILLIAM JOHNSON
CHIEF ENGINEER

REV: IB

DATE: 7-8-21

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IR	INITIAL RELEASE	PREPARED BY: DAVID G. MILLER APPROVED BY: DocuSigned by: William Johnson A2B90D5026794A8... DATE: 07-08-2021 | 9:02 PDT
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1. SCOPE

This specification outlines Controlled Item Part requirements for Erickson 214B/B-1 and 214ST helicopters. It is invoked by ES2002 for legacy drawings, and also by flag note for Erickson-revised and Erickson-created drawings.

1.1 Controlled Item Parts and Total Company Product Assurance

The requirements for model 214 Controlled Item Parts are an integral part of the Erickson Incorporated (EAC) Product Assurance Program. The Product Assurance Program consists of all of the administrative, technical, manufacturing and other functions required to produce products and services which consistently meet all customer requirements. The Quality of EAC products is the responsibility of all EAC functions and disciplines, beginning with initial design and continuing through final expenditure of the product by the customer, to include the entire life cycle of a part.

2. DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

299-100-837	Approved Metallic Materials Source List
ES299-099-371	Controlled Item Part List for 214 B/B-1 and ST
ES2002	Global Design Provisions for 214 B/B-1 and ST

3. REQUIREMENTS

The purpose of this document is to define the basic type design requirements for a Controlled Item Part program for Erickson model 214. The purpose and intent of the program shall be to provide procedures and controls necessary to attain the high reliability required for specific P/N's that are designated as Controlled Item Parts. All EAC departments shall implement the requirements contained herein for positive control of Controlled Item Parts.

3.1 Controlled Item Parts (CIP)

Erickson model 214 design drawings and procurement specifications identify the parts, assemblies and installations that are subject to the Controlled Item Part program. This is done by a flag note which designates the P/N as one of the classifications described in *Classifications* below.

3.1.1 Such a P/N is considered to be a Controlled Item Part (CIP). A sub-set of Controlled Item Parts are the forgings, castings and composite parts which make CIP's, referred to as Makes-a-Controlled Item Part or Makes-a-CIP. Throughout this specification, requirements for CIP's are also applicable to Makes-a-CIP's unless otherwise stated.

3.1.2 A part contained in an assembly or installation designated as a CIP will not itself be considered a CIP unless separately designated as such. Likewise, an assembly or installation containing CIP's will not itself be considered a CIP unless so designated.

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3.1.3 There are many Makes-a-CIP's defined by legacy drawings that are missing the flag note designation. The parts are identifiable as Makes-a-CIP by the fact that they make a Controlled Item Part, and shall be considered Makes-a-CIP based upon the descriptions in *Classifications* below.

3.1.4 Drawings which define CIP's, except for drawings which only define Makes-a-CIP's, also display a decal in the F/D, typically in the vicinity of the title block, which identifies the highest level of CIP Classification for P/N's defined by the drawing, in the order (1) Flight Safety, (2) Critical and (3) Primary (and Primary Traceable). There are not multiple decals when parts with different classifications appear on the same drawing. The decal is intended to facilitate awareness of the fact that the drawing defines CIP's.

3.2 Controlled Item Part List

Erickson Engineering shall maintain ES299-099-371, Controlled Item Part List for 214 B/B-1 and ST, in which all P/N's designated as Controlled Item Parts, including Makes-a-Controlled Item Parts, shall be listed.

ES299-099-371 meets the requirement for a critical parts list in FAR: 14 CFR Part 29.602(b).

3.3 Training, Qualification, and Certification Requirements

Personnel involved in inspection and process control operations, i.e. heat treat, x-ray, etc., affecting Critical Characteristics must be trained, qualified and, when required, certified for the tasks they perform.

3.4 Rough Machining Allowance

Rough machining of a metallic Controlled Item Part at machining suppliers not specifically approved for production of Controlled Item Parts is acceptable provided the following methods and constraints are used:

3.4.1 Rough machining must be included in frozen PRB-approved planning. Sufficient detail about the rough machining shall be included in the planning to demonstrate compliance with the requirements.

3.4.2 Acceptable rough machining methods are:

- Conventional machining
- High speed machining
- Water jet cutting
- Electrical Discharge Machining
- Shearing
- Mechanical cutting (i.e. band saw with toothed cutting blade)
- Chemical Milling

3.4.3 It is not acceptable to use grinding, abrasive cutting, plasma cutting or flame cutting for rough machining of designated product.

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3.4.4 After rough machining operations are completed, a minimum of .100 inches of material shall be removed from all rough machined surfaces by a final machining which is controlled by PRB-approved frozen planning and conducted by an approved source of supply for Controlled Item Parts.

To ensure compliance, .100 inches of material should remain after rough machining considering the maximum material condition of the part. Under no circumstances shall less than .100 inches of material be removed from rough machined surfaces during final machining.

3.5 Abusive Machining Detection (Nital Etch)

For the detection and classification of grinding burns and other surface defects, nital etch inspection shall be performed as follows on Controlled Item Parts manufactured from ferrous metals.

3.5.1 Nital etch inspection is applicable to all ferrous parts having a hardness of Rockwell C 40 (180,000 psi) or greater, but is not applicable to nitrided parts nor parts manufactured from precipitation-hardened steels.

3.5.2 For Erickson-designed parts, nital etch inspection shall be performed per the requirements of BPS 4092. Acceptance criteria are as specified in BPS 4092 unless the drawing provides unique acceptance criteria.

3.5.3 For supplier-designed parts (see *SCD's* below), nital etch inspection shall be performed and acceptance criteria will be the supplier's engineering requirements.

3.5.4 When sampling methods are used, a representative sample of parts selected from each production lot, or the entire lot, if less than ten (10) parts, shall be subjected to nital etch inspection after completion of all machining operations. Should abusive machining be detected on the sample size, all parts within the lot are subjected to nital etch. If statistical inspection is utilized, sampling plans shall preclude the acceptance of lots whose samples have known non-conformities. Sampling plans permitting acceptance of defectives are not allowed.

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4. CLASSIFICATIONS

The following classifications are designated by flag notes on design drawings and procurement specifications for P/N's identified collectively as Controlled Item Parts. Further delineation as the different classifications which follow facilitates varied requirements throughout type design.

4.1 Flight Safety

A **Flight Safety Part** is defined as any part, assembly, or installation whose failure, malfunction, or absence could cause loss of or serious damage to the aircraft and/or serious injury or death to the occupants or ground support personnel.

A **Makes-a-Flight Safety Part** is a casting, forging or composite part which is used to make a Flight Safety Part.

4.2 Critical

A **Critical Part** is defined as any part, assembly, or installation which is non-redundant and in which a failure would result in a condition that would inhibit or prevent a safe landing. An autorotation landing is considered a safe landing.

A **Makes-a-Critical Part** is a casting, forging or composite part which is used to make a Critical Part.

4.3 Primary and Primary Traceable

A **Primary Part** is defined as any part or assembly which requires special Product Assurance controls. Generally, Primary Parts are those for which structural integrity is essential for the safety of the aircraft and the failure of which would result in forced landing of the aircraft.

Primary Traceable Parts are Primary Parts which have been identified by Design Engineering as requiring traceability.

A **Makes-a-Primary Part** is a casting, forging or composite part which is used to make a Primary Part. And a **Makes-a-Primary Traceable Part** is a casting, forging or composite part which is used to make a Primary Traceable Part.

4.3.1 Many legacy drawings classify parts as Primary and also require serialization in the F/D and/or notes. For the purpose of interpreting design requirements, these shall be considered as Primary Traceable (and Makes-a-Primary Traceable).

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5. CHARACTERISTICS

During design development, Controlled Item Parts are evaluated by Engineering for primary and secondary failure modes. Designations of Critical and Significant Characteristics are assigned to part features in order to protect against these failure modes. The characteristics are physical, chemical, visual, functional, or other attributes or areas of a part, including, but not limited to:

- Dimensions
- Tolerances
- Finishes
- Materials
- Assembly
- Manufacturing or inspection processes

Critical and Significant Characteristics are identified on the drawing or procurement specification by statements in the body of text, in drawing notes, and by symbols in the F/D.

- Flight Safety Parts shall have only Critical Characteristics
- Critical Parts shall have Critical and/or Significant Characteristics
- Primary and Primary Traceable Parts may have Significant Characteristics, or have no designated characteristics
- Parts that are not classified as CIP's shall not have Critical or Significant Characteristics designated

5.1 Critical Characteristic

5.1.1 For Flight Safety Parts, a Critical Characteristic is one that, if not in conformance with design requirements, missing or degraded could cause failure or malfunction during the life cycle of the part.

5.1.2 For Critical Parts, a Critical Characteristic is one that, if not in conformance with design requirements, could increase the probability of occurrence of one of the failure modes during the life cycle of the part.

5.1.3 F/D symbol for Critical Characteristics: 

5.1.4 The life cycle shall cover manufacture, operation, field maintenance, and overhaul of the CIP.

5.1.5 Critical Characteristics shall be 100% inspected, or at a frequency established by statistical methods which have been approved by EAC.

5.2 Significant Characteristic

Designation of a Significant Characteristic communicates the need for emphasis on proper performance of operations affecting the feature throughout the manufacturing process.

5.2.1 F/D symbol for Significant Characteristics: 

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6. TRACEABILITY

Flight Safety Parts, Critical Parts and Primary Traceable Parts shall provide traceability as follows:

6.1 Their Makes-a-CIP's shall have traceability from raw material through processing and manufacturing operations to the completed CIP. For castings and forgings that do not have an engineering requirement for serialization, traceability may be accomplished via heat lot or x-ray number.

6.2 Those that are detail parts shall have traceability back to a specific batch/lot of material, and forward to their next assembly.

6.3 Those that are assemblies shall be traceable through their manufacturing operations to a deliverable ship's serial number or as a spare to the sales invoice.

6.4 For those that are installations, traceability shall mean that all Critical and Significant Characteristics shall be traceable via serialization forward to the completed installation which is tied to a specific aircraft serial number.

6.5 Materials consumed by them do not require traceability if those materials: (1) are not associated with a Critical or Significant Characteristic, (2) are used in non-structural applications, and (3) are noted as not requiring traceability on the engineering drawing.
The following do not require #3:

- Adhesive and primer for bonding on plates for identification or other information
- Organic finish and coatings (e.g. primer, top coat, paints)
- Fill and fair and other surfacing materials
- Sealant and corrosion preventative compound
- Grease and lubricants
- Chemical finish and inorganic coatings or plating materials

6.6 Non-CIP assemblies which contain Flight Safety, Critical or Primary Traceable parts shall also be traceable through their manufacturing operations to a deliverable ship's serial number or as a spare to the sales invoice.

7. FROZEN PLANNING

7.1 For each Controlled Item Part, the EAC Planning Review Board (PRB) shall review each manufacturing or assembly process. The procedures outlining each manufacturing process, along with the tooling, equipment and materials, etc. shall be approved by the PRB. Once approved, the procedures are considered "frozen" and shall be annotated as such.

7.2 Changes to frozen planning require approval of the PRB. The PRB may establish exceptions to this requirement provided Engineering participates.

7.3 If the Controlled Item Part is produced or processed by a supplier, manufacturing procedures used by the supplier, including sub-tier and process planning, shall be approved by the EAC

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PRB prior to delivery of the first lot. Revisions to the supplier's procedures are subject to the same approval.

8. PLANNING REVIEW BOARD (PRB)

8.1 The EAC PRB shall review and approve EAC production planning and suppliers' planning for all Controlled Item Parts.

8.2 The PRB shall consist of the following members:

- Manufacturing Engineering (Chairman)
- Engineering
- Quality
- Manufacturing

8.3 A minimum of two (2) representatives are required to approve planning or planning changes; one representative from either Manufacturing Engineering or Engineering, and one representative from Quality.

9. MATERIAL REVIEW BOARD (MRB)

9.1 Material Review Board (MRB) dispositions which result in utilization of Controlled Item Parts that contain non-conforming Critical Characteristics shall require approval from MRB members from EAC Engineering and Quality that have been specifically delegated to address Controlled Item Parts.

9.2 MRB dispositions which scrap a CIP, or involve only non-conforming features other than Critical Characteristics, shall not require special approval.

9.3 Changes to approved (frozen) planning which result from MRB disposition require PRB approval. Detailed rework or repair instructions documented in a non-conformance disposition may fulfill this requirement when approved by the PRB.

9.4 Flight Safety Parts having a non-conformance to Critical Characteristics that cannot be made to conform through rework action shall not be given a disposition by the MRB which results in the part being used as-is or repaired.

10. SOURCE AND SPECIFICATION CONTROL DESIGNS (SCD)

10.1 During development and subsequent revisions, source control and specification control designs (SCD) shall be evaluated by Erickson Engineering and SCD suppliers for applicability to the Controlled Item Part program. Designations of CIP Classification, and Critical and Significant Characteristics shall be added to the Erickson drawings, procurement specifications, and/or the associated supplier design data, as applicable.

10.2 Erickson Engineering shall approve new designs and revisions to existing designs for SCD Controlled Item Parts, including SCD supplier design changes.

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10.3 SCD P/N's that are designated as CIP's shall be sourced from suppliers that are approved for CIP manufacture.

10.4 For supplier-designed CIP's, SCD suppliers may utilize an internal Planning Review Board process in lieu of Erickson's PRB after approval to do so from the Erickson PRB (with Engineering participation).

11. RESPONSIBILITIES

11.1 Engineering

Engineering shall maintain this type design specification, as well as:

a. Evaluate new design P/N's and revisions to existing designs for applicability to the Controlled Item Part program, including supplier-designed parts for source and specification control designs
b. Identify the predicted primary and secondary failure modes for new design CIP's
c. Designate the following in 214 design data for CIP's:
    - CIP Classification
    - Critical and Significant Characteristics
    - Serialization requirements to facilitate traceability
d. Ensure that Instructions for Continued Airworthiness (ICA) incorporate the correct inspection controls and instructions relating to CIP's
e. Maintain ES299-099-371, Controlled Item Part List for 214 B/B-1 and ST
f. Maintain 299-100-837, Approved Metallic Materials Source List

11.2 Manufacturing Engineering

Manufacturing Engineering shall be responsible for establishing the controls and procedures necessary to:

a. Ensure that the intent of Engineering and Product Assurance requirements are being accomplished through planning instructions
b. Ensure traceability of CIP's as discussed in *Traceability* above

Controlled Item Part planning shall include identification of CIP Classification, and contain operations identifying Critical and Significant Characteristics, tooling (if necessary) for verification of Critical or Significant Characteristics, and provide recording operations for serial number traceability. The Controlled Item Part planning will be frozen and not subject to processing changes without PRB approval.

11.3 Manufacturing

Manufacturing shall signify completion of each Critical and Significant Characteristic operation on Controlled Item Part travelers with a buy-off by the operator(s) completing the operation(s). The buy-off will consist of a legible name, or other suitable operator identification as designated by planning instructions, and shall be placed adjacent to the operation number on the planning sheet.

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11.4 Quality

Quality shall provide written procedures and/or instructions for the control of the following:

a. EAC Controlled Item Parts audit program
b. Non-conforming Controlled Item Parts
c. Assurance of Controlled Item Parts conformance
d. Inspection and handling of Controlled Item Parts suppliers, including SCD supplier internal PRB's
e. Continuous evaluation of written quality procedures

11.5 Quality - Engineering

The EAC Quality and Engineering departments shall designate MRB members that are authorized to disposition non-conforming Controlled Item Parts.

11.6 Quality - Procurement

The EAC Quality and Procurement departments shall provide joint procedures to ensure that:

a. Suppliers have demonstrated the capability to fabricate, control and inspect Controlled Item Parts
b. Contracts and purchase orders reflect all necessary requirements
c. Audit schedules are developed and implemented for each supplier

11.7 Procurement

The Procurement department shall submit Purchase Orders and Requests for Proposals for Controlled Item Parts to suppliers who are qualified by the Quality Department to manufacture Controlled Item Parts. Purchase Orders and Request for Proposal packages which include Controlled Item Parts shall be identified with proper notations, and shall include the requirement for compliance with applicable quality procurement requirements relating to Controlled Item Parts.

Raw metallic materials used to manufacture Controlled Item Parts shall be procured from suppliers listed in 299-100-837 except as described in its Preface and Scope.

11.8 Suppliers

11.8.1 Suppliers of Controlled Item Parts, Makes-a-Controlled Item Parts, and assemblies that contain Controlled Item Parts must conform to the special control measures and quality requirements included as contract provisions of Erickson purchase orders for CIP's.

11.8.2 In addition, suppliers of supplier-designed parts are responsible under the purchase order provisions for the initial designation of supplier-designed Controlled Item Part Classifications, and Critical and Significant Characteristics. Such designations require Erickson Engineering approval prior to manufacturing effort by the supplier. See *Source and Specification Control Designs* above.