



# ENGINEERING RELEASE NOTICE

CONTROL NO.

ERN

2019-14119

## CHANGE TO

## CLASSIFICATION

## DATA TYPE

## STATUS

## EFFECTIVITY CODES

TC	<input type="checkbox"/>
STC	<input type="checkbox"/>
N/A	<input type="checkbox"/>

MAJOR	<input type="checkbox"/>
TYPE 3	<input type="checkbox"/>
TYPE 2	<input type="checkbox"/>
TYPE 1	<input type="checkbox"/>
N/A	<input checked="" type="checkbox"/>

NEW DRAWING	<input type="checkbox"/>	AMENDMENT SHEET	<input type="checkbox"/>
DRAWING REVISION	<input type="checkbox"/>	OVERHAUL & REPAIR INSTRUCTIONS	<input type="checkbox"/>
ADVANCED DOCUMENT CHANGE NOTICE	<input type="checkbox"/>	DATA CHANGE REQUEST	<input type="checkbox"/>
ENGINEERING REPORT	<input type="checkbox"/>	TECHNICAL PUBLICATIONS RELEASE	<input type="checkbox"/>
ENGINEERING SPECIFICATION	<input checked="" type="checkbox"/>	CERTIFIED CAD MODEL	<input type="checkbox"/>
ENGINEERING ORDER	<input type="checkbox"/>	TOOL DESIGN CHANGE RECORD	<input type="checkbox"/>

PRODUCTION	<input checked="" type="checkbox"/>
PROTOTYPE	<input type="checkbox"/>
PRELIMINARY	<input type="checkbox"/>
DRAFT	<input type="checkbox"/>

A	INCORPORATE IMMEDIATELY - FLIGHT SAFETY -
B	INCORPORATE AT NEXT O/H
C	UPON DEPLETION OF PARTS
D	OTHER (SEE DISPOSITION)

ENGINE ☒ 1E9 (JT12)  
TC ☒ E15EA (JFTD12A)

DOCUMENT NO. \ REVISION \ TITLE

CONCERTO PROJECT: N/A

DAX PROJECT: N/A

EGTS 310 \ REV. IR \ IDENTIFICATION MARKING - MATERIALS AND ITEMS

8110-3

REQD

N

STC NUMBER: N/A

REQUESTING DOCUMENT(S): N/A

PRODUCTION ORDER: N/A

PART NUMBER	PART NAME	MODEL(S)	CODE
N/A			

DESCRIPTION OF CHANGE \ WHY CHANGE WAS MADE \ IMPLEMENTATION INSTRUCTIONS:

EGTS 310 IS A NEW ERICKSON GAS TURBINE IDENTIFICATION MARKING SPECIFICATION THAT REPLACES PRATT & WHITNEY IDENTIFICATION MARKING SPEC PWA 310. PWA 310 IS NOT SUITABLE FOR USE BY ERICKSON.

THIS CHANGE APPRECIABLY AFFECTS: ☐ WEIGHT ☐ BALANCE ☐ STRUCTURAL STRENGTH ☐ RELIABILITY ☐ AIRWORTHINESS ☒ N/A

DISPOSITION OF PARTS ON HAND \ INSTRUCTIONS TO MATERIALS DEPT:

N/A

SERVICE BULLETIN ACTION REQ'D:

☐ YES: ☒ N/A

LIFE LIMITED ITEM:

☐ YES, Life Limit: ☒ N/A

STRUCTURES: \_\_\_\_\_

DOCUMENT NO.

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PREPARED BY

ADRIAN TITIANU

3/8/2019

CONFIGURATION

3/08/2019

ENGINEERING SUPV

3/8/19

DOCUMENT CONTROL

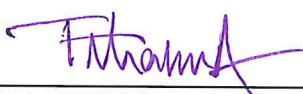
3-11-19




## Erickson Gas Turbine Specification 310

**TITLE:** Identification Marking - Materials and Items


**PREPARED BY:**

  
\_\_\_\_\_  
ADRIAN TITIANU / 3/8/2019  
DATE

**REVIEWED BY:**

  
\_\_\_\_\_  
ERIC ZIESKE / 3/08/2019  
DATE

**APPROVED BY:**

  
\_\_\_\_\_  
IAN GIBSON / 3/8/19  
DATE

REV: IR

DATE: 3-11-19

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REV	DESCRIPTION	BY	APPROVED	DATE
IR	Initial Release	[Signature]	[Signature]	3/8/19

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## **1 ACKNOWLEDGEMENT**

Supplier shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

## **2 SCOPE**

### **2.1 Purpose**

To define, specify, and control marking methods that insure positive identification of materials and items and to establish item marking requirements for identification purposes.

### **2.2 Application**

This specification is applicable where invoked on Erickson drawings, specifications, purchase orders, or other procurement, processing, or inspection documents.

### **2.3 Definitions**

For the purpose of this specification, the definitions listed in Appendix A shall apply.

### **2.4 Corresponding documents**

To the extent specified herein this document meets the requirements of MIL-STD-130N.

### **2.5 Applicable documents**

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

Unless otherwise specified the latest revision shall apply:

#### **2.5.1 Specifications**

Spec PWA 307 "Dot Peen Marking"

Spec PWA 11 "Heat Treatments"

Spec PWA 5 "Laser Marking"

Spec PWA 309 "Traceability Marking"

Spec PWA 36700 "Marking Materials, Temporary"

## **3 MARKING METHODS**

Permanent and temporary markings shall be produced so as to ensure legibility and durability of the mark produced by the selected marking method, but in a manner that will not affect the function or reliability of the item. See APPENDIX C - DATA FOR MARKING METHODS AND CLASSES.

### **3.1 Integral Marking**

Raised or depressed characters produced by casting, forging, or molding. Raised characters shall always be used unless the drawing specifically requires, or permits, the characters to be depressed.

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## 3.2 Applied Marking

Characters are produced by one of the following methods:

### 3.2.1 Etch

#### 3.2.1.1 Electrolytic Etch, Shallow

Characters are produced by removing material with an electrolysis process confined to the area of the characters by a stencil. After marking, residual electrolyte on the part shall be neutralized and, if necessary, a corrosion preventive treatment shall be applied. This method produces a light etching effect so shallow that no discernible depth of impression can be detected when sensitively probing the mark with a fingernail. Service experience has indicated that shallow electrolytic etch markings become illegible, or are lost completely, on surfaces subjected to abrasion, discoloration, maintenance cleaning, etc., and thus, do not assure positive, long-life identification. Unless otherwise specified on part drawings, this method permits the use of other methods at the drawing indicated locations as follows:

- (a) Dot peen marking to .001 maximum depth for markings applied to root surfaces of oil pump spur gears.
- (b) Dot peen marking on thin sheet metal measuring less than .030 thick to a maximum depth equal to  $.011 \sqrt{T}$ , where “T” equals the minimum cross sectional thickness of the sheet metal. Dot peen markings so applied to blade baffles shall be located only within the outer half of the baffle length. Dot peen marking on sheet metal measuring .030 or greater to a maximum depth of .002.
- (c) Dot peen marking when confined within the center one-third of the airfoil length and between the 60 and 80 percent chordal stations on hollow struts and vanes formed from sheet metal having a cross sectional thickness of 0.030 or greater.
- (d) Laser dot matrix marking to .001 maximum depth on turbine blade and vane baffles. Markings so applied to blade baffles shall be located only within the outer half of the baffle length.
- (e) For items other than Source Control and Specification Control, blast markings may be applied, unless otherwise specified, on any surface where the item drawing permits marking by shallow electrolytic etch.

#### 3.2.1.2 Electrolytic Etch, Deep

Characters are produced by removing material with an electrolysis process confined to the area of the characters by a stencil. Process techniques used result in greater depth of marking than provided by 3.2.1.1. The area selected for grounding contact shall permit direct, uninterrupted flow of operating current to the marking area. On assemblies, grounding contact shall normally be made on the same detail being marked; however, grounding contact on another detail is permissible provided that current flow to marking area will pass only through brazed, welded, or tightly-assembled mechanical joints. After marking, residual electrolyte on the part shall be neutralized and, if necessary, a corrosion preventive treatment area shall be applied. The mark and its surrounding area must be free of pits, stains, and burns, except that a slight staining of the area affected by the etch mark will be permitted.

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### 3.2.1.3 Acid Etch

Characters are produced by removing material by the use of an acid. Application of the acid may be by any means, but care shall be exercised to prevent acid or its fumes from spreading to other areas of the item. The surface to be etched shall be clean. After etching, the acid on the part shall be neutralized and, if necessary, the surface given a corrosion preventive treatment.

### 3.2.2 Blast

Characters are produced by the impingement of an abrasive substance confined by a stencil to the area of the characters. When this method is applied, the user shall demonstrate that functional contacting surfaces of the items are properly protected or shielded from particulate (e.g., grit, metal particles) contamination, or that such contamination is subsequently removed by cleaning.

### 3.2.3 Metal Stamp

Characters are produced by forcible displacement of material by the use of stamping dies. Marking dies shall produce fillets and radii at all intersecting surfaces of the characters. Items marked by this method shall have the marking avoid detrimental, induced stresses. This method is not permitted if the hardness at the time of marking is higher than 45 HRC or equivalent. Unless otherwise specified, deep dot peen marking (3.2.15.3) may be used as an alternative method in all locations where the use of metal stamp marking is permitted.

#### 3.2.3.1 Hammer

Characters are produced individually or in groups by impact force produced manually or mechanically. Where this method is specified or permitted on aluminum or magnesium castings, it shall be disallowed in any location where the wall thickness of the surface to be marked measures less than .250 inch at the time of marking.

#### 3.2.3.2 Press

Characters are produced individually or in groups applied with a controlled force, without impact.

#### 3.2.3.3 Roll

Characters are produced by a rotating (rolling) motion of either the item or the dies, or both, when in contact with each other under a controlled force. Unless otherwise specified on the part drawing, this method permits the use of other marking methods at the drawing indicated locations as follows:

- (a) Where the part drawing specifies marking per CLASS 14 BY 3.2.3.3 OR 3.2.10, marking may be applied by Class 42.
- (b) Deep laser (3.2.12.3) may be used as an alternative to roll marking (3.2.3.3) on vanes and where roll marking is permitted on the bottom of roots of blades made of titanium or nickel alloy. Where drawings specify shot peening on the end faces of blade roots, the use of laser marking (3.2.12.3) as an alternative to roll marking (3.2.3.3) is also permitted. However, laser marking so applied shall also comply with the applicable requirements of Spec PWA 5.
- (c) Deep dot peen (3.2.15.3) markings may be applied at any location where the use of roll marking (3.2.3.3) is permitted.

#### 3.2.3.4 Debossing

Indented impressions in foil or sheet metal. Characters are forced below the surface by use of

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standard marking type or die and a soft anvil (hard wood, soft copper, pressed fiber board, etc.). Sets of male and female dies may also be used.

### **3.2.4 Electric Arc Scribe**

This method is not permitted for use on titanium and titanium alloy items and is not active for use on new designs. Characters are produced by the action of an electric arc between the surface of the item being marked and an electrode which acts as a scribe. The grounding contact area of the part must be free of pits and burns.

#### **3.2.4.1 Manual (Non-vibrating)**

Characters are produced by a non-vibrating, hand-guided scribe.

#### **3.2.4.2 Manual (Vibrating)**

Characters are produced by a vibrating, hand-guided scriber.

#### **3.2.4.3 Mechanical (Vibrating)**

Characters are produced by a mechanically-guided (see Appendix A) vibrating scribe.

### **3.2.5 Vibration Peen**

Characters are produced by the forcible displacement of material by a rapidly vibrating conical tool tipped with a spherical radius. Unless the marking class permits, this method is not to be used if the hardness at the time of marking is higher than Rockwell C45 or equivalent. Unless otherwise specified on the part drawing, deep dot peen marking (3.2.15.3) may be used in all locations where this method is permitted.

#### **3.2.5.1 Manual**

This method should be used only where acceptable legibility (see Appendix A) and compliance with para. 4.6 and 4.8 can be assured. Tool is manually guided and has a single tip.

#### **3.2.5.2 Mechanical**

Tool is mechanically guided (see Appendix A) and has a single tip, or has multiple tips producing one or more complete characters simultaneously.

### **3.2.6 Ink (non-etching, unless otherwise specified)**

Characters are produced by the use of non-etching ink that is suitable for the use intended. Nonetching inks applied to metallic surfaces (bare or coated) must comply with the requirements of spec PWA 36700 (Marking Materials, Temporary). Ink may be applied by rubber stamp or by any other method that will not injure the surfaces. Black imprint ink shall be used for marking on decals. Where etching inks are required, they shall be approved by the purchaser for legibility, durability, and after effects. Unless otherwise specified on the part drawing, the following alternative marking methods to ink markings (3.2.6) are permissible:

- (a) Shallow etch (3.2.1.1) may be applied to heatshields and to tube OD surfaces as an alternative marking method to ink marking (3.2.6). However, shallow etch markings applied on tubes must be located on a straight length of tube and be separated from a transition surface (e.g., bend radius, tube end, weld, or swage) by a distance of two tube diameters or where the maximum straight length on the tube is less than 1.500 plus four tube diameters, separated by .250 minimum for nominal diametral tube sizes not exceeding .250 and .500 minimum for tube sizes

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greater than .250 nominal.

- (b) Laminated labels (3.2.14) may be applied to surfaces of composite parts as an alternative to ink (3.2.6) markings. Where the outermost ply of laminate is opaque, it's permissible to add fiberglass over the label as necessary to provide protection and transparency. Fiberglass resin system must be compatible with the laminate resin system.

### 3.2.7 Engrave

Characters are produced by removal of material by a rotating cutter or grinder. When this method is applied the user shall demonstrate that functional, contacting surfaces of the items are properly protected or shielded from particulate (e.g., grit, metal particles) contamination, or that such contamination is subsequently removed by cleaning. Unless otherwise specified, deep dotpeen marking (3.2.15.3) may be used in all locations where this method is permitted.

#### 3.2.7.1 Manual

Cutter or grinder is manually guided. This method should be used only where acceptable legibility (see Appendix A) and compliance with this specification can be assured.

#### 3.2.7.2 Mechanical

Cutter or grinder is mechanically guided (see Appendix A).

### 3.2.8 Brand

Characters are produced by burning or displacing material with a heated tool. This method is suitable for nonmetallic materials.

### 3.2.9 Paint

Characters are produced by painting, with or without a stencil.

### 3.2.10 Drag Impression

Characters are produced by forcible displacement of material by a mechanically-guided (see Appendix A), freely rotating, radius-tipped, conical tool which is drawn across the surface of the item. Where the part drawing specifies marking per CLASS 14 BY 3.2.3.3 OR 3.2.10, marking may be applied by Class 42.

### 3.2.11 Hot Stamp

A heated stamp is pressed onto a pigment-bearing tape held against the part leaving the characters impressed in a contrasting color on the surface of the part.

### 3.2.12 Laser Engrave

Characters are produced by the displacement of material with a pulsating laser beam. Depth is controlled by varying the frequency of the pulsations, the speed of the advance, the focus, and the power of the beam. Displaced material (expulsion) surrounding the marking is permissible except where prohibited by dimensional or surface finish requirements, or when otherwise specified on the part drawing.

#### 3.2.12.1 Laser Engrave, shallow

(see Appendix C)

#### 3.2.12.2 Laser Engrave, intermediate

Items made of hardenable steel must be heat treated after the application of laser marking. Unless otherwise specified, deep dot peen marking (3.2.15.3) may be used in all locations where this method is permitted.

#### **3.2.12.3 Laser Engrave, deep**

Items made of hardenable steel must be heat treated after the application of laser marking. Unless otherwise specified, deep dot peen marking (3.2.15.3) may be used in all locations where this method is permitted.

#### **3.2.13 Scribe**

Characters are produced with the forcible displacement of material by a mechanically-guided (see Appendix A), radius-tipped, conical tool that is drawn across the surface on the item. Method is similar to mechanical drag impression except that the scribing tip is not freely rotating.

#### **3.2.14 Laminated Label**

Preprinted labels are applied to the outermost ply of laminated, plastic structures prior to forming. Labels shall be of .004 maximum thickness, compatible with the material of the item, and shall not be adversely affected by the processing of the item. In the finished part the label shall be encapsulated by the resin used in the lamination.

#### **3.2.15 Dot Peen**

Characters are produced as a matrix of dots applied as spherical indentations by a controlled impingement process. Where required to be automatically read by an Optical Character Reader, dot peen markings shall conform to the requirements of Spec PWA 307 (Dot Peen Marking). See SAE AS9132 for recommended practices for marking the 2D Data Matrix Symbolology.

##### **3.2.15.1 Dot Peen, Shallow**

##### **3.2.15.2 Dot Peen, Intermediate**

##### **3.2.15.3 Dot Peen, Deep**

#### **3.2.16 Laser, Dot Matrix**

This method produces characters in a matrix of dots similar to dot peen, except the dots are applied by the heat of a low powered laser concentrated in the area of the dot. This results in a nugget of solidified metal within the surface of the base metal rather than a recess caused by the localized compression of the metal.

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## 4 GENERAL REQUIREMENTS


### 4.1 Conformance to Specification

Items shall be marked in accordance with this specification unless otherwise specified on the Erickson drawing or purchase order. A vendor shall contact the purchaser for any additional information concerning the requirements of this specification.


### 4.2 Designation of Method

Unless otherwise specified, marking in accordance with this specification is indicated by reference to Specification EGTS 310 and Class (or subparagraph) number(s). Where a specific Class or method of marking is not indicated, use of any marking listed in Appendix C is permissible provided the selected method and the resulting marks conform to paragraph 3 and the quality requirements of this specification. Requirements applying to these are given in Appendix C. Where a method or class, in addition to, or more restrictive than, any permitted by the general marking note, is shown for a given location, such marking shall be restricted to that method or class (see 4.4.2(b)). Where non-etching ink (by 3.2.6) is specified as the sole method of applied marking, shallow electrolytic etch (3.2.1.1) and all permanent methods shall be disallowed for all final, manufacturing, or inspection identification marking.


### 4.3 Determination of Requirements

Where  MARK IDENT PER SPEC EGTS 310 CLASS XX appears on the drawing, determination of what identification is required shall be based on the applicable portions of para. 5, 7, 8, 9, 10, and 11. Where the word “CLASS” has been lined out in the preprinted marking note, and no further marking instructions are given in a general note, this shall mean that all marking methods listed in Appendix C are equally permissible for marking the item. Each package of items shall be marked as specified in para.13.

#### 4.3.1 Package Marking

Where package marking only is required per drawing note MARK IDENT PER SPEC EGTS 310 CLASS 16 without the basic symbol (  ), the item is judged to be too small or otherwise impracticable to be marked. Unless otherwise specified, no permanent marking is required on the item, but each package or container shall be marked as specified in para. 13. Markings may be applied to the item as specified in para.12.1.1 or para.12.1.2, as applicable.

##### 4.3.1.1 Special Markings

Where the package marking note is prefixed by the symbol (  ), only those special markings that are indicated on the drawing are required to be marked on the item: however, each package or container of items shall be marked as specified in para. 13.

##### 4.3.1.2 Markings Prohibited

Where the Erickson drawing specifies MARK IDENT PER SPEC EGTS 310 CLASS 41, or where all reference to identification marking has been deleted and a general note “ANY MARKING ON THIS PART IS PROHIBITED” appears on the drawing, no marking, including temporary process or inspection markings, may be applied to the item. Identification shall be in accordance with the package marking requirements of para. 13., or as specified on the purchase order.

#### 4.3.2 Serial Numbers

An entry of “SER NO. REQD” or “SER NO. REQD REF” in the general drawing identification marking

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note or as a separate general note, indicates that a Erickson provided serial number, per para. 6., must appear on the finished item. The notation “REF”, as shown above, indicates the engineering requirement for the serial number is initiated by a document (e.g. EGTS 310 para. 5.1.1.1, 5.2.1.4 and 5.2.1.5) or a drawing referenced on the drawing.


#### **4.4 Marking Symbol**






The marking symbol used on the field of drawings may consist of only the basic symbol (  ) or it may include other symbols.

##### **4.4.1 Basic Symbol**

The symbol (  ) indicates the specific surface where identification marking is permitted. When used alone, it requires the marking to be done by an applied method except as otherwise noted in Appendix C or on the drawing. Specific areas of a surface where markings must be confined are indicated as specified in para 4.4.2 (d) or by drawing controls that confine markings within specific boundaries that are established by specified part features and/or dimensions. The word HERE, when unsupported by more specific instruction within a drawing notation, does not locate an identification to a specific area of an indicated marking surface.

##### **4.4.2 Compound Symbol**

Where the marking symbol must give more information than that conveyed by the basic symbol (  ) alone, the following additional symbols are used:

- (a) **Integral marking:** The symbol (  ) indicates a requirement for raised, integral marking (cast, forged, or molded). See para. 3.1.
- (b) **Specific method:** Drawing field symbols (  CLASS XX ), or (  by X.X.X (EGTS 310 para. Number)) indicates class or methods (see Appendix C) that are in addition to, or more restrictive than those permitted by the general identification marking note given on the drawing.
- (c) The symbol (  ) indicates the location of a raised pad for applied marking. This symbol may also be used within the casting outline to represent the actual marking pad.
- (d) The symbol (  ) indicates a specified area within which markings shall be confined. This symbol appears within the part outline.

#### **4.5 Optional Locations**

Unless otherwise specified on drawings or herein, multiple marking locations indicated by a basic symbol(s) shall be interpreted as optional marking locations and not as locations for duplicate markings. Where a symbol is qualified by an annotation for a specific identification (i.e., MARK MATE NO.) markings are required at each indicated location unless otherwise specified on the part drawing. When optional locations are indicated, markings shall be grouped using as few locations as practicable.

##### **4.5.1 Interpretation of “EITHER” or “ANY”**

For the purpose of this specification, where the marking instruction includes “EITHER” (e.g., EITHER END) or “ANY” (E.G., ANY name of feature or surface), the features, locations, or surfaces so

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designated are all equally available for application of markings. Marking may appear at any or all locations and need not be restricted to one location only.

## **4.6 Alternative Marking Systems**

### **4.6.1 Marking using human-readable characters**

Unless otherwise specified, the height and style of letters and numbers shall be regular, single line style (e.g., Gothic, Futura, OCR-A (Optical Character Recognition)). Manually formed characters shall approximate the form of those produced by mechanical methods. Capital letters are to be used for all letter marking. Marking characters normally shall be .050 - .160 in. high. However where marking area is unusually small and cannot accommodate all required markings at .050 inch or greater character height, use of character height not less than .028 is required. Where marking area is large, up to .500 inch character height may be used provided all required markings are included. Where the available marking area permits, dot peen marking is to be applied to a height of .050 minimum to provide optimum characteristics for automatic reading of data.

## **4.7 Depth of Markings**

The depths for marking methods are given in Appendix C.

## **4.8 Limitations on Permanent Marking**

Except as permitted by 12.5 and 12.6, permanent marking shall be confined to the surface designated by the drawing. Permanent marking shall not extend onto any radius, chamfer, corner, fillet, or edge adjoining the surface to be marked, unless otherwise permitted or required.

## **4.9 Removal of Raised Metal**

Raised metal caused by marking shall be removed from surfaces that carry a total tolerance of .001 or less. All raised metal surrounding characters on contact surfaces of ball and roller bearings shall be removed, regardless of tolerances.

## **4.10 Surface Treated Parts**

Where the drawing specifies that surface for marking is to be plated, anodized, hard-coated, painted, or otherwise coated, the item shall be marked prior to coating by any method permitted by the drawing that will show through the coating. Where none of the methods specified will show through the coating, the following rules apply:

- (a) Painted, coated, or hard-coated surfaces: Unless otherwise specified after application of these coatings, surfaces shall be marked with ink (para. 3.2.6). Where the indicated location is on an internal painted surface, vibration peen (3.2.5) may also be used if permitted by the drawing. Marking on coated fasteners (e.g., nuts, bolts, etc.) need not be legible in the coated condition provided they are legible when the coating is removed.

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- (b) Anodized or plated surfaces: When marking is necessary after plating or anodize, specified methods may be applied except where the drawing specifically prohibits marking upon, or breaking of, these coatings, or unless otherwise controlled by a Requirement Control Card for purchased items or Manufacturing Quality Instructions (MQI), or Quality Assurance Instructions (QAI) for other items.

## 4.11 Separation of Identification

Required identification numbers (item number, vendor code number, serial number, etc.) may be arranged on separate lines; or consecutive identification number on the same line shall be separated by a distance no less than three spaces. The separation or division of the digits of a human readable identification number (including any corresponding prefixes) will not be objectionable provided the digits are in sequence and there can be no misinterpretation of the information.

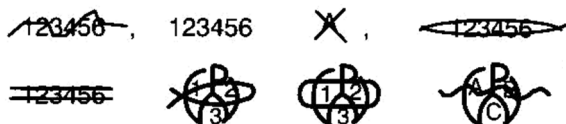
## 4.12 Polishing Cast or Forged Surfaces

In order to obtain acceptable legibility on “as forged” and “as cast” surfaces, especially where markings will subsequently be coated or painted, it is permissible to smooth the area to be marked by polishing or superficial machining provided that the item is not thinned below drawing limit or otherwise injured.

## 4.13 Reidentification or Corrective Marking

Where reidentification or corrective marking is required, deletion of existing markings, or portions thereof, may be necessary. This may be done with an allowable method by producing a wavy line, loop, flat oval, or X's thru the character(s) or symbol(s) to be deleted. Deleting individual characters to correct a part number, serial number, etc. is not acceptable. The entire mismarked number must be crossed out and the correct number remarked.

Acceptable examples:



Not acceptable example:

12~~X~~3456 (Not Acceptable – Individual Character Deleted)

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## 5 MARKING REQUIREMENTS FOR FINISHED ITEMS

### 5.1 Source Control and Specification Control Items

Where either “SOURCE CONTROL DRAWING” or “SPEC CONTROL DRAWING” appears above the title block in the lower right-hand corner of the drawing, and the drawing specifies a marking class other than Classes 16 or 41, the items shall be marked by the supplier with supplier identification (5.1.1) and Item number (5.1.3) as follows:

#### 5.1.1 Supplier Identification -- Human Readable

Required supplier markings are shown in paragraph 5.1.1.1 for assemblies and paragraphs 5.1.1.2 and 5.1.1.3 for details. Additional supplier markings may appear but are not required. In order to provide differentiation between numbers, all supplier applied markings containing numbers shall be prefixed with identifying words or abbreviation consistent with the following examples:

PART NO.	P/N 123456 or (PNR 123456)
SERIAL NO.	S/N B212AA0026 or (SER B212AA0026)
NATIONAL STOCK NO.	NSN 4720-00-391-9717
CONFIGURATION ITEM NO.	CI NO. 341266
PARTS LIST NO.	PL NO. 337466
CAGE CODE	MFR-79320

This requirement does not apply where the identifying word(s) or abbreviations are an integral part of the data plate.

#### 5.1.1.1 Assemblies

The following markings shall be applied by a permanent method to a data plate that is securely fastened to the item:

- Erickson Item Number in SOCN Format per paragraph 5.1.3
- Serial Number, assigned in accordance with Section 6. (optional for Spec Control Assemblies)
- Supplier’s name and address
- Supplier’s design activity CAGE code
- Supplier’s assembly part number
- Supplier’s latest parts (stock) list number or equivalent
- Nomenclature of item (as shown in the Parts Listing of the Erickson engineering drawing)

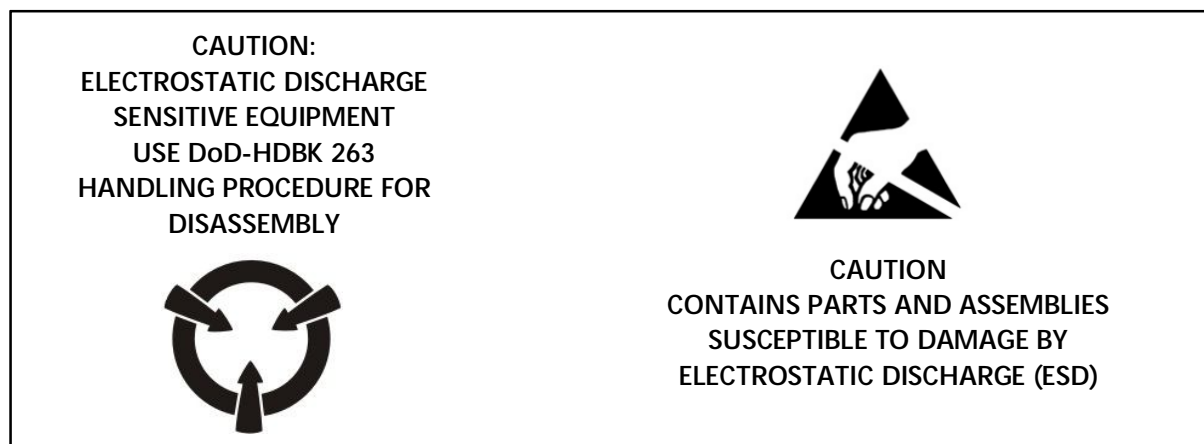
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For assemblies without a data plate, identification marking shall be applied directly to the surface of the item by a permanent method. Space permitting (see Appendix A - Suitable and Sufficient Space), this marking, in the following order of precedence must include:

- Erickson Item Number in SOCN Format per paragraph 5.1.3
- Serial number, assigned in accordance with Section 6 (optional for Spec Control Assemblies)
- Supplier's Assembly part number
- Supplier's design activity CAGE code

In addition to the above markings, Sensitive Electronic Device (SED) Items classified as sensitive to damage from electrostatic discharge in accordance with MIL-STD-1686 and DOD-HDBK-263 shall be marked per MIL-STD-1285. Assemblies containing SED parts shall be marked with the SED symbol (see Figure 1) in a location that will be readily visible when the assembly is installed in its next assembly. Assemblies marked with the SED symbol shall, subject to the availability of marking area, be marked with a cautionary note similar to the one shown in Figure 1.



**SENSITIVE ELECTRONIC DEVICE SYMBOL  
FIGURE 1**

#### **5.1.1.2 Details Not Represented by Erickson Drawings**

Each salable detail that has suitable and sufficient surface for marking shall be marked with the supplier's design activity CAGE code and the supplier's detail part number by a permanent method.

#### **5.1.1.3 Details Represented by Erickson Drawings**

The following markings shall be applied by a permanent method on each detail that has suitable and sufficient surface for markings (see Appendix A - Suitable and Sufficient Space), in the following order of precedence:

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- Erickson Item Number in SOCN Format per paragraph 5.1.3
- Supplier's design activity CAGE code
- Supplier's detail part number and latest change designation
- Supplier's identification (name, trademark, or symbol)

Where Erickson Source Control drawings of nuts and bolts specify marking of supplier code, that marking requirement may be alternatively satisfied by the marking of the supplier's design activity CAGE code, name, trade mark, or symbol.

### 5.1.2 Supplier Marking Location

Supplier markings may appear in any location except that a reasonable separation between these markings and required Erickson markings shall be maintained.

### 5.1.3 Erickson Item Number in SOCN (Source Control Notation) Format -- Human Readable

The Erickson CAGE code appearing in the Erickson drawing title block (9R802), the source control notation (SOCN) and the Erickson part number, suffixed with the latest change designation shall be applied by a method permitted by the drawing on all assemblies and details represented by a Erickson drawing. No prefix is required. The characters shall be consecutive except for the revision letter, which must be separated by a distance of no less than three spaces.

(Example: 9R802SOCN80678932 A)

#### 5.1.3.1 Omission of Marking

Markings specifically requested by Erickson and markings specifically indicated on drawings (e.g., "MARK PART NO. & SUPPLIER CODE", "MARK MATING NO.", "SER NO. REQD", "FUEL IN", "OIL IN", ...etc.) shall not be omitted. However, the required markings of para. 5.1.1.1 and 5.1.1.3 as applicable, may be omitted in accordance with the following:

- (a) Where size or shape of an item does not permit marking with all the required markings, the markings shall be as agreed upon by the purchaser and the supplier based on the order of precedence indicated in para. 5.1.1.1 and 5.1.1.3, as applicable, except that the minimum of these markings shall consist of the Erickson part number and latest change letter. See Appendix A - Suitable and Sufficient Space.
- (b) The Erickson item number in SOCN format may be waived on Source Control & Specification Control details where purchased in an assembly.

## 5.2 Items other than Source Control and Specification Control Items

With the exception of those additional markings required or permitted by para. 7, 8, 9, 10, and 11 for castings, forgings, and raw materials, the items shall be marked with the following information only:

### 5.2.1 Required Markings

- Erickson Item Number      See 5.2.1.1
- Latest Change Designation      See 5.2.1.2

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- Supplier Code See 5.2.1.3
- Serial Number See 5.2.1.4, 5.2.1.5, 5.2.1.6
- Other Markings See 5.2.1.7
- Erickson and MFR CAGE See 5.2.1.8
- Date Code See 5.2.1.10

Unless otherwise shown, the applicable identification markings listed above must appear on all items including those assembled in larger items. Such markings are not required where Package Marking Class 16 is invoked and are not permitted where Package Marking Class 41 is invoked (see 4.3.1, 4.3.1.1, and 4.3.1.2). Markings may be partly or totally omitted according to 5.2.2 provisions.

#### 5.2.1.1 Erickson Item Number

The complete item number shall be marked on the part. Unless otherwise specified by the purchaser, the letters “ASSY” shall be prefixed to the item number where the Erickson drawing title contains “Assembly”, “ASSY”, “ASSY-OF”, or “WELDMENT”. Where the Erickson CAGE code is omitted per para 5.2.2(d), a space may appear between “ASSY” and the Erickson item number but is not required. Unless otherwise specified, the latest change designation (see 5.2.1.2) must always accompany the item number. Drawing notes, such as “MARK PART NO.” shall be interpreted to mean part number and latest change designation.

#### 5.2.1.2 Latest Change Designation (See Appendix A)

Required marks shall be located on the item as follows:

- (a) As a suffix to the item number on all items except size-classified, over-size, or under-size. A space is permitted between the item number and the latest change designation, but is not required.
- (b) The latest change designation shall be prefixed by a “C/” (C-slash) for all size classified (including flow area classification), oversize, or undersize items where the complete item number consists of the drawing number plus an alpha-numeric suffix, as tabulated under “PART NO.” on the field of the drawing. The preferred location shall be that following the complete part number, but separated by a distance no less than three character-spaces.

Example: 123456P7M7 C/ M

Acceptable arrangements:

123456P7M7 or C/ B  
C/ A 123456CL3

- (c) If, due to part configuration or size, there is insufficient room to mark unincorporated change designations, it is permissible to suffix the item number marking with an asterisk (\*) and mark unincorporated change designations on any other authorized marking surface. (See Appendix A).
- (d) The advancement of the change letter for part marking is an optional requirement where the latest drawing revision does not affect parts, tools, or materials as defined by the related engineering change document.

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- (e) Unless otherwise specified on the part drawing, the requirement to mark the latest change letter is optional when the identity of the applicable letter is retained within the part serialization record.

### 5.2.1.3 Supplier Code

This code, which is only applied in human readable marking, is assigned by Erickson, and is required on all supplier produced items when the purchaser is Erickson except: (1) Source Control and Specification Control items described in 5.1, (2) Items where the drawing specifies a Erickson name and data plate, (3) Engineering Source Approval Parts that are strictly items embodying features covered by U.S. Patent and manufactured exclusively by the owner of the patent, (4) Self-locking nuts, self-locking bolts, and self-retaining bolts, and (5) anti-friction bearings and, (6) unless otherwise specified, serialized items where the supplier's identity is included within the serialization record. This code shall not be used where the purchaser is other than Erickson (See para. 5.2.1.8). The supplier code shall be located on the item in the vicinity of, and preferably on a separate line beneath the CAGE code marking requirement (5.2.1.8). Where size or shape of an item does not permit the marking of both the supplier's code and the FQA (Fastener Quality Act) insignia (see 5.7) the item shall be marked with the FQA insignia, provided Erickson has been made aware of the manufacturer's US Patent and Trademark Office registered insignia.

In general, the supplier's code marked on items will be the code of the supplier (first tier) receiving the Erickson Purchase Order. However, when a supplier (first tier) is furnished Erickson (P & W) designed items by another supplier (second tier), and both supplier's (first & second tiers) are under the surveillance of Erickson Supplier Quality Assurance, the items may be marked with the supplier code of the supplier (second tier) actually manufacturing the item. Where the supplier code of the second tier supplier is marked on the item, it may be in lieu of, or in addition to, the supplier code of the first tier supplier. Where both supplier codes are marked, the format shall be the supplier code of the first tier supplier followed by a slash (/) and the supplier code of the second tier supplier. (Example: 12345 / 67890)

### 5.2.1.4 Serial Numbers on Items Having a Erickson Data Plate (with Erickson Name)

Serial numbers are required on those items where the drawing specifies a **Erickson** data plate (with **Erickson** name) by part number callout. Serial numbers shall be established per SOP 8404 and as specified in para. 6.

NOTE: The practice of using a three-digit identifying number as part of the serial number (see Appendix B) is no longer being used. Appendix B of this specification contains sources for older items marked with serial numbers still reflecting this former practice.

### 5.2.1.5 Serial Numbers on Items Having a Erickson Data Plate (without Erickson name)

Serial numbers are required on those items where the drawing specifies a data plate by Erickson part number callout. Where item is produced or purchased by Erickson, serial numbers shall be as specified in para. 6.

### 5.2.1.6 Serial Numbers on Items Having No Data Plate

Serial numbers shall be assigned by and obtained from Erickson where the drawing identification marking note contains "SER NO. REQD." Unless otherwise specified, serial numbers shall be marked by a permanent method permitted by the drawing, shall be located in close proximity to the Erickson

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part number marking, and, except for turbine blades and vanes and certain other parts with limited surface areas for marking, shall be prefixed by the notation “S/N” or “SER”.

#### 5.2.1.7 Other Markings

These markings shall be as required by the purchaser.

#### 5.2.1.8 Commercial and Government Entity (CAGE) Code

Parts shall be marked with the Erickson CAGE code appearing in the drawing title block (9R802) and the CAGE code of the manufacturing activity on all parts where the supplier code is not marked because the purchaser is other than Erickson as specified in para. 5.2.1.3. For parts where Erickson is the purchaser or manufacturer human readable CAGE code marking is required except as noted in para. 5.2.2. For detail items, the Erickson CAGE code prefix shall be separated from the marked part number by a hyphen (-) or dash.

The CAGE code of the manufacturing activity, prefixed by the letters MFR and a hyphen (-) or dash, shall be marked directly below the Erickson CAGE code where space permits. See (b) below. Where marking area below the Erickson CAGE code is limited, the manufacturing CAGE code may appear on the same line separated by three spaces. See

(c) below. CAGE code marks shall be applied by any marking method permitted for application of the part number. Acceptable marking patterns are as follows:

- (a) Where Erickson is the manufacturer.

Assembly example:  
9R802ASSY12345678

Detail part example:  
9R802-2345678

- (b) Where Erickson is not the manufacturer, preferred pattern:

Assembly example:  
9R802ASSY123456A  
MFR-98765

Detail part example:  
9R802-2345678  
MFR-98765

- (c) Where Erickson is not the manufacturer, alternate pattern:

Assembly example:  
9R802ASSY123456A MFR-98765

Detail part example:  
9R802-2345678 MFR-98765

#### 5.2.1.9 Country of Origin (see Appendix A)

Unless otherwise specified the country of origin may be marked on all parts not made within the United States of America. Part marking shall be applied by any method and in any location permitted by the part drawing. See paragraph 13 for package marking requirements.

#### 5.2.1.10 Date Code

The date code shall be marked, adjacent to the Erickson Supplier Quality Representative's (SQR) identification (Final Acceptance Symbol), on all parts that are not serialized and where there is no item identification (e.g., heat code and suffix number, serial number or lot number) that provides traceability to pertinent supplier inspection records that indicate the final acceptance date. Where the final acceptance symbol is applied to a package instead of a part, the date code shall be applied to the part adjacent to or below the Supplier Code (5.2.1.3). The date code shall be the six digit number of the calendar month, day

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and year in which the final acceptance symbol is applied or the production month, day and year the part was manufactured.

Examples:

040900 means April 9, 2000

121400 means December 14, 2000

### 5.2.2 Omission of Markings

Markings specifically requested by Erickson and markings specifically indicated on drawings (e.g., "MARK PART NO. & SUPPLIER CODE", "MARK MATING NO.", "SER NO. REQD", "FUEL IN", "OIL IN"...etc.) shall not be omitted. However, the required markings of para. 5.2.1 may be omitted in accordance with the following:

- (a) Where size or shape of an item does not permit marking with all the required markings of para. 5.2.1, markings shall be as agreed upon by the purchaser and the supplier except that the minimum of these markings shall consist of the part number and latest change letter. Supplier Code followed by Date Code in order of precedence shall be marked in any remaining available space. See Appendix A - Suitable and Sufficient Space.
- (b) The required markings of para. 5.2.1 may be omitted from (1) nonsalable items (i.e., items determined to be not procurable as spare parts), (2) details, either salable or nonsalable where purchased in an assembly and fastened therein by a permanent joint (see Appendix A), and (3) strip or coil stock vanes sold as spares. Unless otherwise specified, where items not recommended for spares are sold as spares, the required markings of para. 5.2.1 shall be marked by the method specified and in the location indicated on the drawing.
- (c) The latest change designation may be waived for nonmachining assemblies (e.g., gearbox assemblies, rotor and stator assemblies, etc.) produced by the assembly floor for engine build.

### 5.2.3 Integrally Marked Numbers

Where an integrally marked number and the final item number are identical and the drawing specifies that both are to be located on the same surface, the item number need not be marked by applied means if the integral marking remains after finishing. However, integrally marked prefixes or suffixes shall be removed and the latest change designation of the finished part (see 5.2.1.2) shall be added, if different than the integrally marked revision symbol, by an applied method permitted by the drawing. Integral supplier identification and equipment numbers shall be retained.

### 5.2.4 Small Data Plate

Where identification marking of an item is accomplished on a small data plate, the minimum marking on the data plate shall be the Erickson item number, CAGE code, and serial number. Under such circumstances, all other required markings that cannot be included on the data plate shall be marked in their entirety on a metal tag which shall also include the item number. This tag shall be wired to the item and removed just prior to shipment.

### 5.2.5 Antifriction Bearing Identification

All required markings on anti-friction bearings shall be applied to a depth not less than .0002 minimum. Maximum marking depth limits are as specified in Appendix C. When laser marking is used, the

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manufacturer must demonstrate process control of the Heat Affected Zone to .004 in. maximum and a recast/rehardened zone of .002 in. maximum and demonstrate process control on a periodic basis as agreed upon by Erickson Quality Assurance. The Heat Affected Zone is comprised of Physical Depth, Recast Layer, Rehardened Zone, and Retempered Zone. For specific types of bearings, the following subparagraphs supplement the marking requirements of this specification and the Erickson drawing:

(a) **Roller, Ball, and Needle Bearings**

- (1) Supplier's name or registered trademark may appear on these items.
- (2) The words "MADE IN USA" may appear on these items.

(b) **Accessory Ball Bearings**

Part numbers (or portions thereof) other than those assigned by Erickson shall be obliterated or cancelled from this item by means of drawing wavy lines thru the number by one of the marking methods specified for this item by the Erickson drawing. This requirement is applicable to ball bearings where the nominal bore size is less than 75 mm (2.9528 in.) and/or where a tolerance class other than ABEC Class 7 is specified on the Erickson drawing.

(c) **Oscillatory Ball Bearings and Needle-type Roller Bearings**

The manufacturer's bearing identifying numbers (or portions thereof) may appear on the following items.

- (1) Ball bearings where the Erickson drawing (title block or general note) indicates that the item is to be used for oscillatory applications.
- (2) Needle-type roller bearings utilizing cylinders (or needles) whose length-diameter ratios are 3:1 or greater.

### 5.2.6 Compressor Blades

Processing suppliers, if directed by the purchaser, shall permanently mark compressor blades, other than fan blades, with the date of manufacture in lieu of the heat code applied by the raw material supplier (see para. 8.1.2(a)). The processing supplier shall also maintain records that will provide traceability to the raw material heat code(s) used during the period of time indicated by the marked date of manufacture.

### 5.2.7 Permitted Markings

The following markings are permitted:

- (a) **Supplier Markings:** Except for containers fabricated to Military specifications, any supplier markings may appear on packaging (P-number) items. On containers fabricated to Military specifications, supplier markings shall be restricted to the specification and Erickson drawing requirements.
- (b) **Inspection and Processing Symbols:** Such symbols may be permitted by the purchaser provided they do not embody the supplier's name, identifying initials, or trademark.

## 5.3 Interchangeability Control (IC) Number Items

Where the Erickson purchase order specifies an IC-number, the item shall be marked in accordance with 5.1 or 5.2 using the actual item number; the IC-number shall not appear on the item.

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## 5.4 AN, AS, MIL, MS and NASM Items

Items purchased to AN (Air Force-Navy Aeronautical Standard), AS (SAE Aerospace Standard), MIL (Military Specification) (MS (Military Standard) or NASM (National Aerospace Standard) item numbers shall be marked as specified on the applicable standard unless otherwise specified on the purchase order. Latest change designation markings are not required on these items or their packages.

### 5.4.1 Manufacturer's Identification for AN, AS, MIL, MS, NASM Items

This is the actual manufacturer's name, registered trademark, CAGE code for Manufacturer (see Appendix A) Fastener Quality Act Insignia.

## 5.5 Preformed Packing Identification

Where the drawing calls for EGTS 310 Part Marking Specification Class 16 (Package Marking) individual preformed packages shall be identified and packaged in accordance with AMS 2817 except that envelope sizes may vary to accommodate packaging equipment on hand.

## 5.6 Fasteners

Fasteners that are subject to the Fastener Quality Act (FQA) (Public Law 101-592, as amended), which are certain screws, nuts, bolts, studs and washers, may be marked with the manufacturer's FQA insignia by a method and in the location specified on the engineering drawing. The FQA insignia shall have been registered with the US Patent and Trademark Office and shall be marked in accordance with the FQA.

## 6 ITEM SERIAL NUMBERS

Where serial numbers are required on finished items (see 5.1 and 5.2) the following requirements shall be met except as otherwise noted in 5.2.1.6:

- (a) Serial numbers shall be assigned per SOP 8404.
- (b) A serial number series shall not be restarted because of change in design either with or without change of item number. However, a series may be restarted because of change in item number if the new item number is of completely new design or different function, but only with the approval of Erickson project engineering. A series identified with CI (Configuration Item) number shall not be restarted unless the CI number is changed.
- (c) Where a change in design is incorporated, the first unit of an item not already serialized that includes the change shall be assigned a serial number higher than any unit still to be completed or accepted under previous changes in design.
- (d) Where the serial number is to be applied to a data plate, it shall be inscribed in the marking pad area reserved for this identification. Where the serial number is to be applied directly onto the surface of an item, it shall be prefixed (except on turbine blades and vanes) by the notation "S/N" or "SER".
- (e) Serial numbers are uniquely assigned to all parts that contain a drawing note "SERIAL NUMBER REQUIRED" and the serial numbers cannot be re-assigned from or to any other parts. Where a serialized component is incorporated into a subsequent level part that does not require a serial number, the lower level serial number may be used at the subsequent level for internal traceability, however the serial number must remain assigned to the serialized

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part in the Erickson Serialization Log.

- (f) Traceability numbers issued for in process marking of details or assemblies that do not contain a drawing note “SERIAL NUMBER REQUIRED” may be re-assigned to subsequent parts that incorporate that detail or assembly. The Erickson Serialization Log must be changed appropriately each time a traceability number is re-assigned.

## 7 **MARKING REQUIREMENTS FOR CASTINGS THAT ARE NOT TO BE MACHINED ALL OVER**

### 7.1 **Raised Pads**

When specified on the Erickson drawing, raised pads shall be located where indicated and raised 0.060 in. above the surface.

#### 7.1.1 **Marking on Raised Pads**

Space on raised pads shall be economically used in order to insure that sufficient area remains available for subsequent marking requirements for finished item(s) including higher assembly markings, and for manufacturing and inspection in-process identification. Pads may be machined sufficiently to create a smooth marking surface.

### 7.2 **Supplier Markings**

All markings are to be on the surfaces indicated and by the methods specified on the **Erickson** drawing. Unless otherwise specified or permitted (see 7.2.5), the supplier shall mark castings with the following information.

#### 7.2.1 **Integral Marking**

When specified by the drawing, the following shall appear as integral marking:

- (a) **Erickson Casting Number:** The casting number on existing drawings consists of a basic number, a casting revision designation (letter), and a suffix which identifies the material (e.g., 654321B-4434). Where a casting revision designation (letter) is not given on the drawing the basic casting number shall be suffixed with the latest change designation that reflects the latest revision in the casting (i.e., affecting the pattern and/or mold).
- (b) **Material Identification:** Unless otherwise specified applies only where the material specification number is not a suffix to the basic casting number.
- (c) **Equipment Number (of Pattern and/or mold):** This number shall identify the equipment used to make the casting.

##### 7.2.1.1 **Supplier Identification**

The casting supplier’s trademark, identifying letters, or symbol approved by the purchaser is/are permitted if the casting supplier is not also the first-tier supplier (see definition-Appendix A).

##### 7.2.1.2 **Integral Marking Corrections**

Integral markings may be re-marked, when necessary, in the integrally marked area by an applied method acceptable to the drawing, or by vibration peen provided that the casting cross-section is no less

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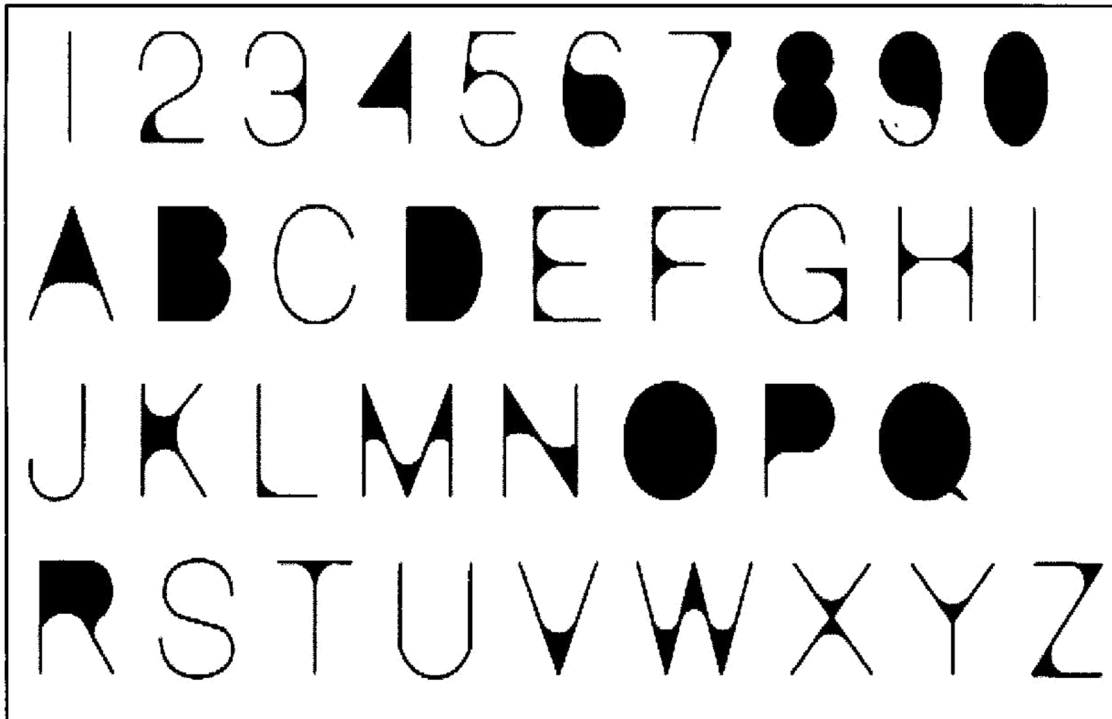
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than .050 in.

### 7.2.1.3 Integral Marking of Human-Readable Characters

Unless otherwise specified, integral markings shall conform to the requirements of paragraph 4.6.1 except that for castings where character size is .250 or less characters may be filled in as shown in figure 5 provided the legibility and durability requirements of paragraph 3 are met.



**FIGURE 5**

### 7.2.2 Integral or Applied Marking

The following shall appear as raised integral marking, or as applied marking.

- (a) **Heat Number, or Melt and/or Heat Treat Batch Number:** Where required, castings shall be identified by heat number, or melt and/or heat treat batch number.
- (b) **Supplier's Code:** Where the casting supplier's trademark, letters, or symbol permitted by 7.2.1.1 do not appear on the casting, the first-tier supplier's code assigned by the purchaser shall appear either integral or applied marking.

### 7.2.3 Applied Marking

The following shall appear as applied marking:

- (a) **Erickson Casting Number:** If pattern equipment is used to produce castings of different material, the casting number shall be ground off the casting and the correct casting number (7.2.1(a)) shall be applied on the casting in the same location by a method permitted by the

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drawing, or by vibration peen provided that the casting cross-section is not less than .050 in.

- (b) **Serial numbers:** Where serial numbers are required on castings in addition to, or in place of, heat number, or melt and/or heat treat batch number, the purchaser shall so advise the supplier who shall apply such numbers on each casting in the area indicated on the Erickson drawing. Where only serial numbers are required on the casting, the serial number shall serve the same purpose as the heat number, or melt and/or heat treat batch number. All such information shall be recorded against the serial number by the supplier and shall be furnished to the purchaser on request.

#### 7.2.4 No Integral Marking

Castings whose drawing do not permit integral marking shall be identified by applied marking if permitted by the Erickson drawing.

#### 7.2.5 Omission of Markings

Where size and shape of the casting will not permit marking with all of the above information, markings shall be as agreed upon by Erickson and the first-tier supplier except that minimum marking shall consist of the Erickson casting number plus other markings specifically called for on the drawing.

### **8 MARKING REQUIREMENTS FOR FORGINGS THAT ARE NOT TO BE MACHINED ALL OVER**

These forgings are identified by Erickson drawing numbers that include the letter “F” OR “S” prefix, and require marking per EGTS 310 Part Marking Specification Section 8.

#### **8.1 Supplier Markings**

Unless otherwise specified, the supplier shall mark these forgings with the following information where permitted by the Erickson drawing. Integral markings may be re-marked, when necessary, in the integrally marked area, by an applied method acceptable to the drawing, (see 8.1.4) or by vibration peen provided that the forging cross-section is not less than .100 in.

##### **8.1.1 Integral Marking**

The following, except as specified in 8.1.3(a) and 8.1.5, shall appear as integral marking.

- (a) **Erickson Forging Number:** This number shall be suffixed with the change designation representing the latest revision incorporated in the forging (i.e., affecting the forging die).
- (b) **Die Equipment Number:** This number shall identify the die equipment used to make the forging.

##### **8.1.1.1 Supplier Identification**

The supplier’s trademark, identifying letters, or symbol approved by the purchaser is/are permitted if the forging supplier is not also the first tier supplier (see definition - Appendix A).

##### **8.1.2 Integral or Applied Marking**

The following shall appear as integral marking or as applied marking.

- (a) Except as specified in 8.1.3(b), all forgings shall be identified by heat number (or equivalent code), lot number, or with a symbol identifiable with the heat or lot number as follows:

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- (1) Forgings shall be identified by heat number (or equivalent code) where forging stock is identifiable with melt or mill heat number. Forgings having the same heat identification shall be made from forging stock originating from a single melt of metal.
- (2) Forgings shall be identified by lot number where heat identification is not applicable. A lot of forgings shall be those forgings of the same number produced consecutively in a single manufacturing lot from stock conforming to the chemical composition requirements of the applicable material specification. Where heat treatment is specified, separate lot numbers shall be assigned to each furnace load, or each heat treatment run in the case of continuous furnaces, of forgings from each manufacturing lot.
- (b) Supplier's Code: Where the forging supplier's trademark, identifying letters, or symbol permitted by 8.1.1.1 do not appear on the forging, the first-tier supplier's code assigned by Erickson shall appear as either integral or applied marking.

### 8.1.3 Applied Marking

The following shall appear as applied marking:

- (a) **Erickson Forging Numbers:** If dies are used to produce forgings of different materials, the integral forging number and change designation shall, unless otherwise specified, be ground off and the correct forging number and change designation shall be applied on the forging in the same location by a method permitted by the drawing, or by vibrationpeen provided that the forging cross-section is not less than .100 in.
- (b) **Serial Numbers:** Where serial numbers are required on forgings in addition to, or in place of, heat or lot identification, the purchaser shall so advise supplier who shall apply such identification on each forging in the area indicated on the Erickson drawing. Where only serial numbers are required on the forging, the serial number shall serve the same purpose as the heat or lot identification. All heat or lot number identification shall be recorded against the serial number by the supplier and shall be furnished to the purchaser on request.

### 8.1.4 Identification of Forgings

Forgings that must be rotated in the dies during formation and forgings whose drawings do not permit integral marking shall be identified by applied marking if permitted by the Erickson drawing.

### 8.1.5 Omission of Markings

Where size and shape of the forging will not permit marking with all of the above information, markings shall be as agreed upon by Erickson and the supplier, except that minimum marking shall consist of the Erickson forging number plus other markings specifically called for on the drawing.

## **9 MARKING REQUIREMENTS FOR CASTINGS AND FORGINGS THAT ARE TO BE MACHINED ALL OVER AND PRODUCTION CONTROLLED RAW MATERIAL--EXPANDED RINGS, WELDED RINGS, AND SPECIAL ITEMS**

These items are identified by drawing numbers that include a number and a letter as a prefix, and marking per EGTS 310 Part Marking Specification para. 9. is a drawing requirement.

### **9.1 Supplier Markings**

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Except where otherwise specified on the drawing, the supplier shall mark these items with the following information:

- (a) **Item Number:** This number shall be suffixed with the change designation representing the latest change incorporated in the item (i.e., affecting the forging die or the casting pattern/mold).
- (b) **Equipment Number of Die or Pattern and/or Mold:** This number shall identify the die equipment, or pattern and/or mold equipment used to make the item. This applies to all forgings except those that must be rotated in the dies during formation, and to all castings.
- (c) **Heat Number, Melt and/or Heat Treat Batch Number, or Serial Number:** These numbers apply to castings and shall be as required in 7.2.2(a) and 7.2.3(b).
- (d) **Heat or Lot identification, or Serial Numbers:** These apply to forgings and shall be as required in 8.1.2(a) and 8.1.3(b).
- (e) **Weld Lot Number:** This applies to all flash butt welded rings.
- (f) **Supplier's Identification:** This shall be the supplier's trademark, identifying letters, or symbol approved by or first-tier-supplier's code assigned by
- (g) **Other markings:** As required by Erickson.

#### 9.1.1 Omission of Markings

Where size and shape of the item will not permit marking with all of the above information, markings shall be as agreed upon by Erickson and supplier.

#### 9.1.2 Permissible Marking Methods

Unless otherwise specified, the supplier shall use one of the following marking methods in any suitable location: raised integral 3.1, permanent applied (Class 39 or 3.2.1.2 in accordance with Appendix C), durable ink, or paint.

#### 9.1.3 Experimental Ring Orders Specifying "Production Delivery"

Paragraph 10.2 is applicable.

## **10 MARKING REQUIREMENTS FOR EXPERIMENTAL RAW MATERIAL--CASTINGS, FORGINGS, AND RINGS**

### **10.1 Castings and Forgings**

#### **10.1.1 Supplier Markings**

Unless otherwise specified by Erickson, suppliers shall mark castings and forgings with information specified in this document either by integral or applied marking. However, supplier's heat number (or equivalent code) shall be prefixed by the letters "HT".

#### **10.1.2 Erickson Markings**

Castings and forgings shall be marked by with the following information.

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- (a) **Lot Number:** Castings and all magnesium and aluminum forgings shall be identified by receiving lot number.
- (b) **Heat Code:** Ferrous forgings shall be identified by heat code.

## 10.2 Rings

### 10.2.1 Supplier Markings

Unless otherwise specified by Erickson, the supplier shall mark these rings with the following information:

- (a) **Material Identification:** Rings shall be marked on the OD with the color code representing the material specification number. Material ordered to Development specification shall be identified by a narrow yellow stripe preceding the first color of the code. All colors and application of stripes for code shall be in accordance with 11.2.1 and 11.2.2.
- (b) **Size:** The nominal (purchase order) size of the ring shall be marked on the OD with yellow paint (mark OD X ID X thickness).
- (c) **Hardness:** The actual measured Brinell hardness shall be marked on the OD of the ring with yellow paint.
- (d) **Heat Number (or Equivalent Code):** The supplier's heat identification shall be marked on the OD of the ring by metal stamp. The heat identification shall be prefixed by the letters "HT" and, where the ring is of flash butt welded construction, suffixed with the letter "W". The heat identification shall be encircled with yellow paint.

#### 10.2.1.1 Paint Used For Markings

Paint used for markings shall be of exterior quality to permit outdoor storage of rings.

### 10.2.2 Erickson Markings

Rings shall be marked by Erickson with the Erickson heat code.

## 11 MARKING REQUIREMENTS FOR DRAWN, ROLLED, AND EXTRUDED METALS

### 11.1 Supplier Markings

Unless otherwise specified by **Erickson**, the supplier shall identify drawn, rolled, and extruded metallic materials in accordance with requirements of the latest issue of the applicable material specification. In addition, plate, flat sheet, and flat strip over 6 in. wide shall have the rows of marking. parallel to the direction of final rolling. Also, tubing .250 in. and over in OD having .016 in. and over in wall thickness shall be marked with the information required by the identification section of the applicable material specification. Material not ordered to specification shall be identified as agreed upon by Erickson and the supplier.

### 11.2 Erickson Markings

Drawn, rolled, and extruded metallic materials shall be marked in accordance with applicable Erickson Inspection Procedures.

### 11.2.1 Color Coding

If color codes are used for bars and tubes they shall consist of a stripe for each digit of the specification, using different colors for each numeral, as follows:

- |         |          |
|---------|----------|
| 1 Black | 6 Orange |
| 2 Blue  | 7 Orchid |
| 3 Brown | 8 Red    |
| 4 Gray  | 9 White  |
| 5 Green | 0 Yellow |

### 11.2.2 Width of Color Stripes

The color representing the first digit in the material specification number shall be a 1 in. wide stripe; stripes representing the remaining digits shall be distinctly narrower than one inch.

### 11.2.3 Material Not Having AMS or PWA Specifications

Material not ordered to AMS or PWA specifications shall be marked with a narrow stripe of color designated by Erickson Inspection to denote the origin of the requirements to which the material is ordered followed by colors as in 11.2.1 and 11.2.2 identifying the material. Identify the latest specification revision letter, if any, as a suffix to the heat code, but distinctly separated from the code by a dash.

## 12 APPLICATION OF MARKINGS

### 12.1 Permissible Options

#### 12.1.1 Source Control Items and Specification Control Items

Where the Erickson drawing specifies Class 16 (package marking) any supplier markings may appear on the item, but are not required. Such markings may be applied by a permanent or temporary method.

#### 12.1.2 Items Other Than Source Control Items and Specification Control Items

Blast (3.2.2) markings may be applied, unless otherwise specified, on any surface where the item drawing permits marking by shallow electrolytic etch (3.2.1.1). Where the Erickson drawing specifies Class 16 (package marking) or makes no reference EGTS 310 Part Marking Specification, any identification data listed in 5.2 may be applied to the item by ink (3.2.6), blast (3.2.2) or shallow electrolytic etch (3.2.1.1) on any surface which, after assembly, does not move relative to a contacting surface: Exceptions:

- (1) **Tubes, tie rods, and airfoil surfaces of blades and vanes:** No shallow electrolytic etch (3.2.1.1) or blast (3.2.2) markings permitted unless otherwise indicated herein or on the part drawing. Shallow etch (3.2.1.1) may be applied to tube OD surfaces as an alternative method to the ink marking (3.2.6) indicated by part drawings. Also, required assembly markings, other than special applied markings, that are located on fittings per drawing indicators, may be alternatively marked by shallow electrolytic etch (3.2.1.1) on tube OD surfaces. However, all shallow etch markings applied to tube surfaces, in detail or at assembly, must be located on a straight length of tube and be separated from a transition

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surface (e.g., bend radius, tube end, weld, or swage) by a distance of two tube diameters. Where the maximum resultant straight length on the tube is less than 1.500 plus four tube diameters the minimum separation between the marking and the surface of transition shall be .250 for tube diameters of .250 or less, and .500 for tube diameters greater than .250. Ink markings applied to airfoil surfaces are not subject to confinement within a specified area unless the drawing specifies the content of those markings.

- (2) **Items controlled by Spec EGTS 310 Part Marking Specification Class 41 (see 4.3.1.2):**  
No markings of any kind permitted.
- (3) **Major rotor compressor and turbine disks, hubs and shafts:** Unless otherwise specified on the drawing, shallow electrolytic etch (3.2.1.1) and blast (3.2.2) markings that are permitted on conical or web areas must be strictly confined to the center one-third of flat of those areas.

#### 12.1.2.1 Required Markings

Where the Erickson drawing specifies both permanent and temporary marking (without defining the content of those markings), the required markings specified in 5.2.1 shall be applied by a permanent method unless otherwise specified.

#### 12.2 Painted or Hard-Coated Surfaces

Where the location indicated on the assembly drawing for permanent type marking is painted or hard-coated, and marking after painting or hard-coating is necessary, ink (3.2.6) shall be used; if permitted by marking class shown in Appendix C. Where the indicated location is on an internal painted surface, vibration peen (3.2.5) may also be used if permitted by the drawing. All final ink markings on assemblies shall be over-coated with transparent varnish or lacquer except on packaging (P) items.

#### 12.3 (This paragraph intentionally left blank)

#### 12.4 Inspection Markings

Inspection process identification marking and symbols, including final acceptance symbol, shall be subject to the same rules as are applicable to process markings: see paragraph 12.5.

#### 12.5 Process Markings

##### 12.5.1 Permanent

Any permanent method of marking may be used to provide identification throughout manufacturing operations, but such markings and their effects shall be removed during subsequent processing if placed in any location, or applied by a method, not permitted by the drawing. Marking on assemblies by a permanent method on surfaces other than those specified by the assembly drawing is permitted provided that, (a) the location and marking method selected for marking is allowed by the detail drawing of the item on which marking is applied, (b) material thickness has not been reduced thru subsequent manufacturing operations, and (c) the surface to be marked has not been altered thru subsequent processing (e.g., plating, painting, coating, etc.). Also, deep electrolytic etch (3.2.1.2) markings may be applied on any surface on which metal stamp, roll (3.2.3.3) or drag impression (3.2.10) is permitted.

##### 12.5.2 Temporary

Blast (3.2.2) markings may be applied, unless otherwise specified, on any surface where the item drawing permits marking by shallow electrolytic etch (3.2.1.1). For ease of identification during

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processing, ink (3.2.6), blast (3.2.2), and shallow electrolytic etch (3.2.1.1) markings may be applied to any surface which, after assembly, does not move relative to a contacting surface. Exceptions:

- (1) **Tubes, tie rods, and airfoil surfaces of blades and vanes:** No shallow electrolytic etch (3.2.1.1) or blast (3.2.2) markings permitted unless otherwise indicated herein or on the part drawing. Shallow etch (3.2.1.1) may be applied to tube OD surfaces as an alternative method to the ink marking (3.2.6) indicated by part drawings. However, shallow etch markings so applied must be located on a straight length of tube and be separated from a transition surface (e.g., bend radius, tube end, weld, or swage) by a distance of two tube diameters. Where the maximum resultant straight length on the tube is less than 1.500 plus four tube diameters, the minimum separation between the marking and the surface of transition shall be .250 for tube diameters of .250 or less, and .500 for tube diameters greater than .250. Ink markings applied to airfoil surfaces are not subject to confinement within a specified area unless the drawing specifies the content of those markings.
- (2) Items controlled by Spec EGTS 310 Class 41 (see 4.3.1.2): No markings of any kind permitted.

### 12.5.3 (This paragraph intentionally left blank)

### 12.5.4 Weld and Thermal Identification

Unless otherwise specified on the drawing, the weld and thermal treatment identification, when applied, shall be located in the location shown on the drawing for other markings. On nonrotating parts, weld and thermal treatment identification may be optionally located adjacent to the weld when such location is outside the heat-discolored zone, within one inch of the weld, and closer to the applicable weld than any unrelated weld, unless otherwise specified on the part drawing.

### 12.5.5 Marking Methods

Where weld and thermal treatment identifications are applied in the locations indicated on the drawings of the details or “assembly of” for other markings, they may be applied by any method permitted for these other markings. Except for airfoil surfaces of blades and vanes, tubes, tie rods, surfaces that move relative to contacting surfaces, sections less than 0.030 in. thick, and as noted in 4.2 and 4.3.1.2, any of these weld and thermal treatment identifications placed outside the indicated marking locations may be applied by vibration peen (3.2.5) if the markings are no deeper than 0.004 inch.

**NOTE:** Refer to Spec PWA 11, HEAT TREATMENTS, for additional requirements pertaining to heat treatment identification.

## 13 SUPPLIER SHIPMENTS TO ERICKSON

Packaging for supplier shipments to Erickson shall be specified on the Erickson Purchase order.

## 14 MODIFICATIONS

Engineering changes are not required for the following:

- (a) Additions to the list of definitions in Appendix A.
- (b) Additions or corrections to the list of identifying numbers in Appendix B.

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**15 REJECTIONS**

Materials and items will be subject to rejection where there is evidence of improper selection of marking methods, poor workmanship in applying Engineering required markings, or marking by press or roll metal stamp that are deeper than maximum depths given in Appendix C. Items marked by any permanent method other than press or roll metal stamp to depths in excess of maximum depths given in Appendix C may be subject to rejection.

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**APPENDIX A****DEFINITIONS****COUNTRY OF ORIGIN IDENTIFICATION**

These markings specify “MADE IN” followed by the English name of the country of origin. Abbreviations that unmistakably indicate the name of a country, such as “Gt. Britain” for “Great Britain” or “Luxemb” for “Luxemburg” are acceptable. Variant spellings that clearly indicate the country of origin, such as “Italie” for “Italy” or “Brasil” for “Brazil” are also acceptable.

**COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE:**

A five-character code that provides a unique activity identifier used by the Government for activity identification.

**DESIGN ACTIVITY**

An organization that has, or has had, responsibility for the design of an item.

**ENTERPRISE IDENTIFIER (EID)**

An activity identifier code assigned to the entity that is responsible for assigning the unique identifier to an item (see Unique Identification-Appendix A). Enterprise identifier codes are uniquely assigned by a registration (or controlling) authority [e.g., Dun & Bradstreet’s Data Universal Numbering System (D-U-N-S), Uniform Code Council (UCC)/European Article Number (EAN), Commercial and Government Entity (CAGE) Code, NATO CAGE (NCAGE) Code.

**FEDERAL SUPPLY CODE IDENTIFICATION NUMBER:**

See Commercial and Government Entity (CAGE) code.

**IDENTIFICATION**

Any marking appearing on an item or package for the purpose of providing data such as engineering control, manufacturing control, inspection acceptance, engine location, supplier, etc.

**INTERCHANGEABILITY CONTROL (IC) NUMBER**

A number whose supporting drawing contains the phrase “(INTERCHANGEABILITY CONTROL NO.)” in the title.

**INTERMEDIATE PACKAGE**

An interior container that contains two or more unit packages of identical items.

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**ITEM**

A part, assembly- of, assembly, set, or piece of equipment.

**ITEM NUMBER**

Unless otherwise specified, the item number (i.e., part number) is the number of the drawing that describes the item. The item number for size-classified, undersize, and oversize items is the drawing number plus an alpha-numeric suffix as listed under the heading PART NUMBER in the tabulation on the field of the drawing. The marked suffix for oversize items uses the letter “P” to indicate (+) size; for undersize items it uses the letter “M” to indicate minus (-) size. The item number for a dash number item is the drawing number, a dash, and suffix of two or more numeric characters as listed under the heading PART OR IDENTIFYING NO. or the heading PART NO. in the tabulation on the field of the drawing. Manufacturing Assembly Spec (MAS) numbers and Assembly Floor Spec (AFS) numbers are sometimes used as temporary item numbers.

**LATEST CHANGE DESIGNATION**

The latest drawing revision or change that has been incorporated in the item. The latest change designation for items defined on Tabulated or Integral Parts List drawings is that indicated in the REV LTR or PART REV LTR column rather than the latest drawing revision. For finished items, this consists of the revision symbol or letter only.

The latest change designation is followed by any unincorporated change designations in reverse alphabetical and/or numerical order with a hyphen (-), or minus sign separating unincorporated change designation, from the latest change designation, and separating single designations from multiple designations (Note: Where the part drawing does not include a general note that waives the requirements to advance the part change designation per para. 5 or para. 13, the marking requirement is automatically waived when the disposition of the applicable change reads PARTS, MATERIALS, AND TOOLS NOT AFFECTED.

Examples:

123456 H, 123460M-LKH, 123462AH-ADAC-Z,

123458CL2 Ø M, 123459CL2  
Ø M

**LEGIBILITY**

Characters shall normally be readable with ease and accuracy by the unaided eye. However, where unusual area or surface limitations exist, a maximum magnification of 3.5X is permissible to provide the required level of readability.

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**MATING NUMBER**

One of a continuous series of numbers that is used to identify all parts of an item that are match-machined or have other matching requirements. On a serialized item, the serial number may be used as a mating number, when required.

**MAJOR ROTOR PART**

For the purposes of this document a part shall be defined as a major rotor part if it is a mainshaft, hub, disk lenticular seal, turbine disk side plate, free turbine coupling, or a rotating, full ring, air seal or spacer. These parts shall be defined as major rotor parts even though the marking of a suffix to the heat code is not a requirement.

**MANUFACTURING TRACEABILITY NUMBER**

A Erickson issued number assigned in accordance with paragraph 6. for use where a serial number is not invoked on the engineering drawing but unique item identification is required.

**MECHANICALLY-GUIDED MARKING**

Characters are produced in either of the following ways:

- (1) A marking instrument is held and guided by a pantographic device, or
- (2) A marking instrument is hand-held and its marking tip is confined to the area of the characters by a metal plastic stencil, or guide, firmly positioned on the surface to be marked, or
- (3) Formation of characters is controlled by a computer program that guides a marking instrument or device.

**PERMANENT JOINT**

The fastening of one part to another by welding, brazing, soldering, cementing, glueing, swaging, crimping, molding, casting, riveting, peening, or staking, (but not minor bending operations for installing cotter pins, tab washer, lockwire, etc.).

**PERMANENT MARKING**

Marking that is legible during the normal service life of the item. Permanent marking methods are listed in Appendix C.

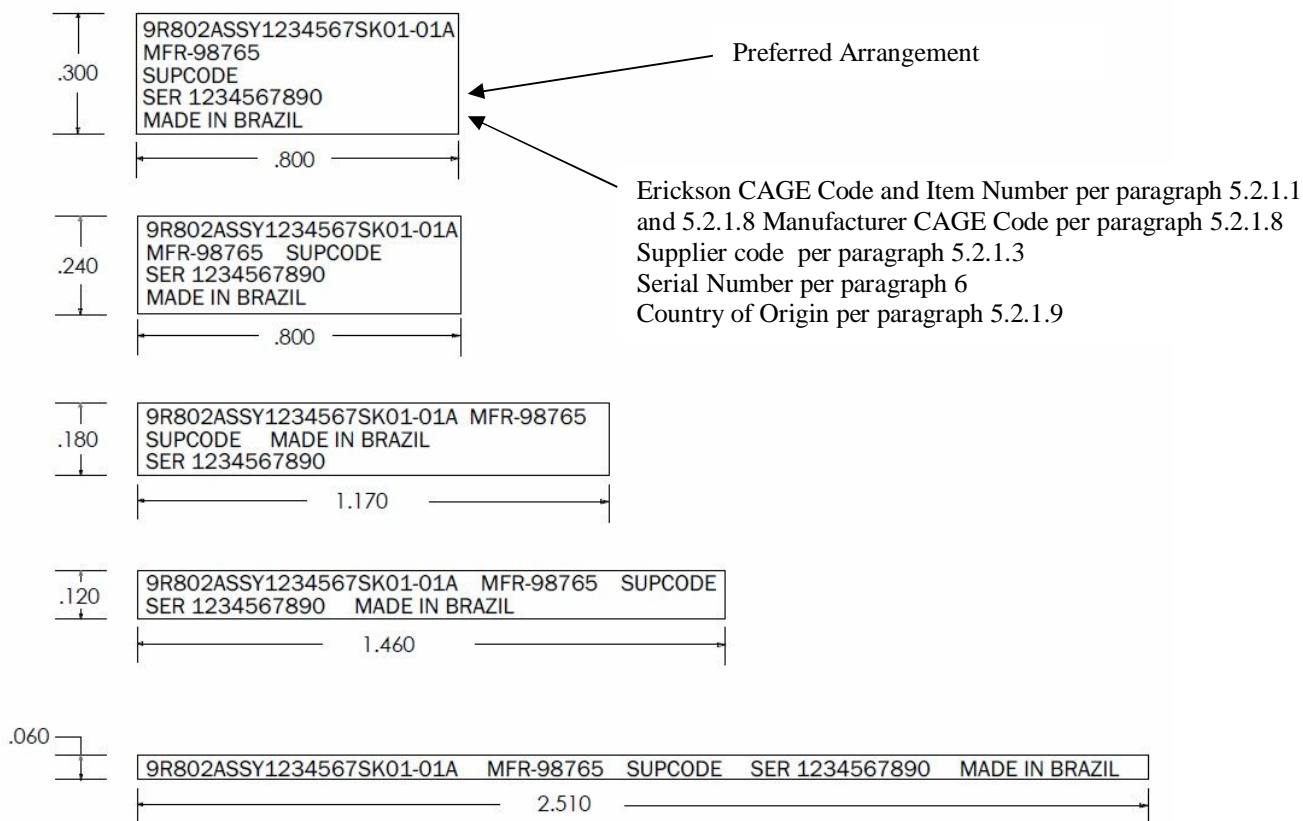
**SUITABLE and SUFFICIENT SPACE**

An area or areas specified on the drawing, accessible for marking by one or more methods permitted on the drawing and large enough to contain all required markings at a character size of .030. See figures 6 and 7 for examples of approximate maximum area sizes for human readable marking. Where marking space is inadequate or unsuitable to meet requirements contact Quality Assurance for assessment per paragraph 5.1.3.1(a) or 5.2.2(a) as applicable.

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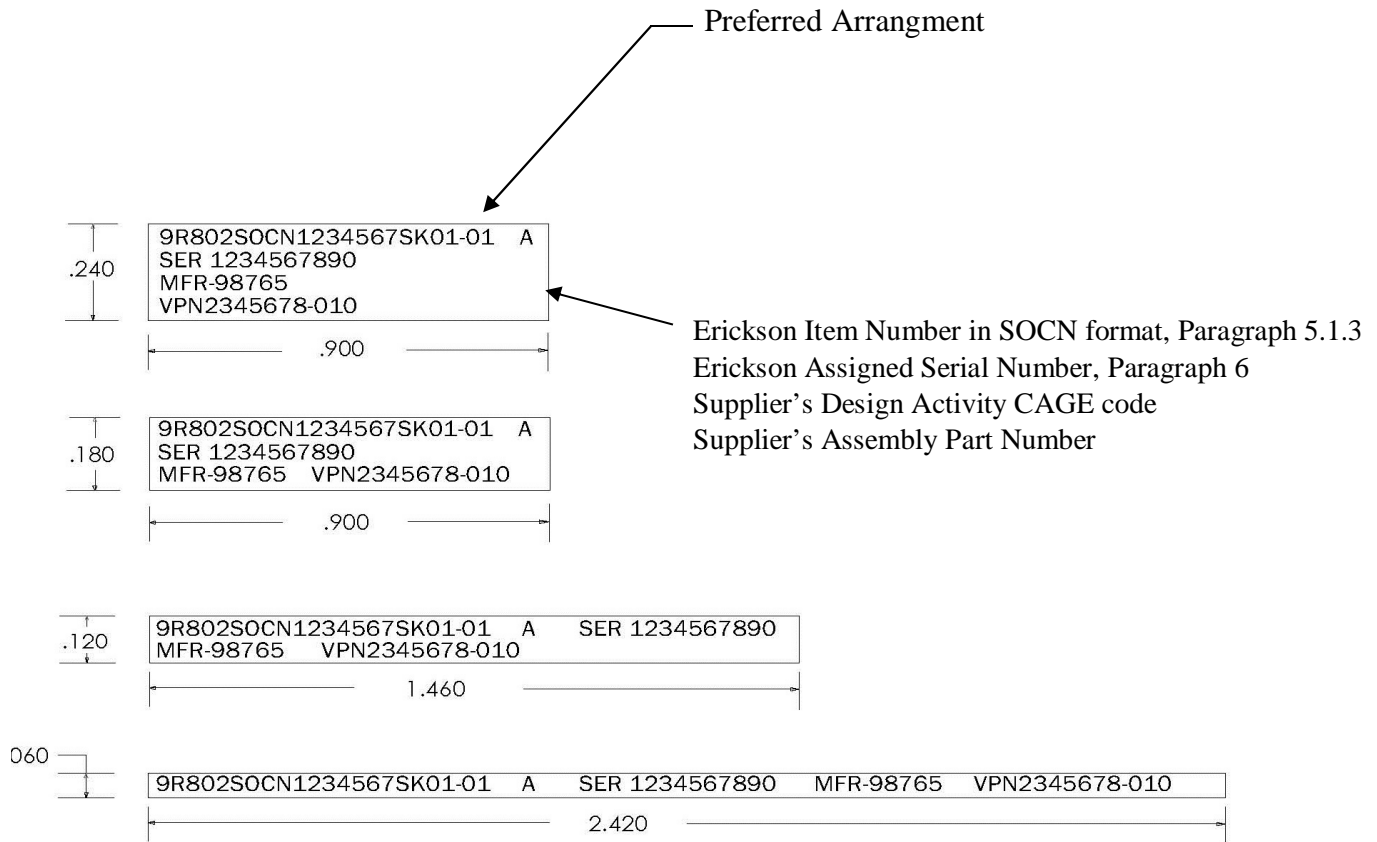


**EXAMPLES OF HUMAN READABLE MARKING AREA SIZES USING .030 CHARACTER SIZE. AREA SIZES MAY BE LARGER OR SMALLER DEPENDING ON PART SPECIFIC REQUIREMENTS. MARKING MAY FOLLOW PART CONTOUR. MARKING MAY BE SPLIT WHERE MULTIPLE MARKING AREAS ARE PROVIDED ON THE DRAWING**

**FIGURE 6**

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Marking Shown per Paragraph 5.1.1.1 for  
Source Control Assemblies Without a Data Plate.

**EXAMPLES OF HUMAN READABLE MARKING AREA SIZES USING .030 CHARACTER SIZE. AREA SIZES MAY BE LARGER OR SMALLER DEPENDING ON PART SPECIFIC REQUIREMENTS. MARKING MAY FOLLOW PART CONTOUR. MARKING MAY BE SPLIT WHERE MULTIPLE MARKING AREAS ARE PROVIDED ON THE DRAWING**

**FIGURE 7**

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**APPENDIX A (Continued)****SUPPLIER (also known as vendor)**

An individual, company, firm, or corporation that enters into a written agreement with Erickson, to perform work or furnish supplies.

**TEMPORARY MARKING**

Marking that will insure identification during ordinary handling and storage of items prior to final assembly and use. Temporary marking methods are listed in Appendix C.

**UNIT PACKAGE**

The first container applied to a single item or a multiple thereof, or a group of items of a single part number, preserved or unpreserved, that involves a complete or identified package.

**UNIQUE IDENTIFICATION (UID)**

A combination of data elements for an item that is globally unique and unambiguous, to ensure data integrity and data quality throughout life, and to support multi-faceted business applications and users.

**Erickson** uses the UID marking method whereby items are serialized within the enterprise. This is accomplished by using **Erickson** EID (i.e., CAGE code 9R802 or as applicable) together with the **Erickson** serial number. This is the technique used and required in Figures 2, and 3 where the **Erickson** CAGE code and **Erickson** serial number are encoded in the machine readable markings. (see Enterprise Identifier-Appendix A)

**VENDOR**

See supplier.

**FIRST TIER SUPPLIER**

A supplier who manufactures items for delivery on a Erickson Purchase Order.

**SECOND TIER SUPPLIER**

A supplier who produces or processes for subsequent use by a first tier supplier.

The same definitions apply with the words “the United States Government” substituted for **Erickson**, when government procurement from sources other than **Erickson** is permitted by contract with Erickson Inc.

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## APPENDIX B

### (INACTIVE – SEE PARAGRAPH 5.2.1.4) PRODUCING SOURCE IDENTIFYING NUMBERS

The following identifying numbers shall be used to denote the producing source of items of equipment requiring serial numbers in accordance with 5.2.1.4.

Producing Source	Identifying number	Producing Source	Identifying number
Pratt & Whitney Group United Technologies	600	Helicoil Controls Division	625
Hamilton Standard division of United Technologies	603	Ex-Cell-O Corp	626
Bendix Energy Controls Division The Bendix Corporation	606	Airesearch Manufacturing Company Div. of the Garrett Corp	629
Fulton Sylphon Division Robertshaw Controls Co	609	General Laboratory Associates	630
United Aircraft Products, Inc	611	National Water Lift Company A Div. of Pneumo-Dynamics Corp.	631
Hydro-Aire Div. Crane Company	612	Cadillac Gage Co.	632
Solar Div. of International Harvester Company	613	Rocketdyne - Division of North American Aircraft	633
Birken Manufacturing Co. Bloomfield, Ct.	615	Aerojet-General Company	634
Chandler Evans Colt Industries, Inc	616	The Tally Corporation	635
Parker-Hannifin Corp	618	Altair Inc.	636
Lycoming Division Avco Manufacturing Corp.	624	Bertea Corp.	637

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# APPENDIX C

## DATA FOR MARKING METHODS AND CLASSES

Method	Spec. Para No.	Depth		Class Number (Active for new design)																			
		Min	Max (e)	14	16	29	30	31	32	36	37	38	39	40	41	42	43	44	45	46	47		
Permanent Method (Note (e) Applies)				A S P E C I F I C A T I O N S T I F I C A T I O N S	P A C K A G E I D E N T I F I C A T I O N S																		
Integral	3.1		---																				
Electro Etch, Shallow (i)	3.2.1.1	(d)	.0003					C	C	C		X	X		C	C						C	
Electro Etch, Deep (i) (n)	3.2.1.2	.0005	.002					X			X	X	X	X	X	X		D	X	X	X	X	D
Acid Etch	3.2.1.3	(d)	.0005					X			X	X	X										
Blast (i)	3.2.2	(d)	.0003					X			X	X	X										
Metal Stamp, Hammer (b)	3.2.3.1	(d)	.010							B	B	B	B		B								
Metal Stamp, Press (c)	3.2.3.2	(d)	.006 (k)							B	B	B	B	B	B	B					B	B	
Metal Stamp, Roll	3.2.3.3	(d)	.006 (f)							B	B	B	B	B	B	B		X		X	B	B	X
Metal Stamp, Debossing (0)	3.2.3.4	(d)	.025																				
Mechanical	3.2.4.3	(d)	.001					X			X	X											
Vibration Peen Manual	3.2.5.1	(d)	.006							B	B	B	B	B	B	B		D/E			B	B	D/E
Vibration Peen Mechanical	3.2.5.2	(d)	.006							X	X	X	X	X	X	X		X			X	X	X
Engrave, Manual	3.2.7.1	(d)	.006 (l)					X		X	X	X	X	X	X	X			X		X	X	
Engrave, Mechanical	3.2.7.2	(d)	.006 (l)					X		X	X	X	X	X	X	X		X	X		X	X	X
Brand	3.2.8	(d)	.010							X		X	X		X								
Drag Impression	3.2.10	(d)	.006 (l)					X		X	X	X	X	X	X	X		X	X	X	X	X	X
Laser Engrave Shallow	3.2.12.1	(d)	.0004 <sup>(m)</sup>									F	X	G							X		
Laser Engrave Intermediate	3.2.12.2	(d)	.003									F	X										
Laser Engave Deep	3.2.12.3	(d)	.005 (l)							X	X	F			F							F	X
Scribe	3.2.13	(d)	.0007											X							X		
Laminated Label	3.2.14									X													
Dot Peen, Shallow	3.2.15.1	.0002	.0007											X									
Dot Peen, Intermediate	3.2.15.2	(d)	.0015																				
Dot Peen, Deep	3.2.15.3	(d)	.003 (h)							X		X	X		X	X		X		X		X	X
Laser, Dot Matrix	3.2.16	(d)	.001																				
Temporary Method																							
Ink	3.2.6	---	---							X	X		X	X									
Paint	3.2.9	---	---							X		X	X										
Hot Stamp	3.2.11	---	---																				
See page C2 for symbol definitions.																							

See page C2 for symbol definitions.



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## APPENDIX C (Continued)

### DEFINITIONS

- X Indicates method permitted.
- B Indicates method permitted if hardness at time of marking does not exceed HRC 45 or equivalent.
- C Unless otherwise specified on the drawing, or except as noted below, indicates method to be used only where the symbol  appears on the drawing. Exception: Although the symbol  does not appear on the drawing, integral marking on the heads of headed, externally threaded parts, other than tie rods, tie bolts, and countersunk head configurations, shall be permissible to a raised height of .010 maximum.
- D Indicates method permitted for manufacturing and inspection in-process marking, including final acceptance symbol. This method of marking is not permitted for engineering required markings (e.g., part number, serial number, etc., -- see para. 5.)
- E Indicates method permitted for reidentification and cancellation required on turbine blades and vanes as a result of corrective work and/or engineering requirements.
- F Indicates method permitted. Items made of hardenable steel must be heat treated after application of laser marking.
- G Indicates method permitted on anti-friction bearings as an alternative to electrolytic etch, deep (3.2.1.2), vibration peen, mechanical (3.2.5.2), mechanical engrave (3.2.7.2), and drag impression (3.2.10). When this method is used for marking plated bearing cages, base material penetration is not required.
  - (b) Indicates method is not permitted on aluminum or magnesium castings in locations where the wall section is less than .250 thick at the time of marking.
  - (c) Indicates method permitted where 3.2.3.3 is permitted provided characters are individually applied.
  - (d) For applicable minimum depth see definition for LEGIBILITY and PERMANENT MARKING, as defined in Appendix A.
  - (e) Unless otherwise specified herein or on the part drawing, the depth of marking on major rotor type parts (see Appendix A) shall not exceed .003 maximum. On disks with axial slots the maximum depth limit may be .006 when confined to drawing designated marking areas located between blade slots. On uneven, as-cast or as-forged surfaces, the maximum depth may be increased, but only to the extent necessary to obtain legibility.
  - (f) Maximum depth of .010 is permissible when the drawing allows both metal stamp roll (3.2.3.3) and metal stamp hammer (3.2.3.1).

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**APPENDIX C (Continued)****DEFINITIONS**

- (h) Unless otherwise specified, indicates:
- (1) Marking depth on static parts may be increased to .005 maximum only where the parts are to be subsequently coated, the cross sectional material thickness is greater than .030, and the material hardness does not exceed HRC 45.
  - (2) On fan blades, all required markings on the bottom of the blade root in the drawing designated area shall be applied to a minimum depth of .003, and a maximum depth of .006. Minimum depth requirements waived for Hollow Fan Blades, see Appendix C (d).
- (i) See also para. 12.5.1.
- (k) Indicates a maximum depth of .015 is permissible on the side of main shaft bearing rings.
- (l) Unless otherwise specified on the part drawing, indicates marking depth on titanium and titanium alloy parts shall not exceed .003 maximum when located on other than on the bottom surface of blade roots.
- (m) Indicates a maximum depth of .0006 is permissible for anti-friction roller bearings and cages.
- (n) Metal stamp, hammer (3.2.3.1) and metal stamp, press (3.2.3.2) to a maximum depth of .006 may be used instead of electro etch, deep (3.2.1.2) on bearing cage outer diameters (if inner land riding bearing) or cage face, provided marking is performed prior to cage pocketing.
- (o) Where metal stamp, debossing (3.2.3.4) is the only method of marking called out on heatshield drawings, shallow electrolytic etch (3.2.1.1) may be used for manufacturing and inspection in-process marking, including the final acceptance symbol.

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# APPENDIX C (Continued)

## INACTIVE- DATA FOR MARKING METHODS AND CLASSES

Method	Spec. Para No.	Depth		Class Number (Inactive for new design)																															
		Min	Max (e)	1	2	3	4	5	6	7	8	9	10	11	13	15	17	18	19	20	21	22	23	24	25	26	27	28	33						
Permanent Method																																			
Integral	3.1		---							X	X				X				X	X			C	C	C	C	C	C	C	C	C	C			
Electro Etch, Shallow (i)	3.2.1.1	(d)	.0003	X	X	X	X	X	X	X				X	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X			
Electro Etch, Deep (i)	3.2.1.2	.0005	.002	X	X	X	X	X	X	X	X			X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X			
Acid Etch	3.2.1.3	(d)	.0005	X	X	X	X	X	X	X	X			X	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X			
Blast (i)	3.2.2	(d)	.0003	X	X	X	X	X	X	X	X				X	X			X	X		X	X	X	X	X	X	X	X	X	X	X			
Metal Stamp, Hammer (b)	3.2.3.1	(d)	.010	B	B		B			B	B			B	B	B			B	B	B		B	B	B							B			
Metal Stamp, Press (c)	3.2.3.2	(d)	.006 (k)	B	B	B	B			B	B	B			B	B	B			B	B	B		B	B	B	B	B	B	B	B	B			
Metal Stamp, Roll	3.2.3.3	(d)	.006 (f)	B	B	B	B			B	B	B			B	B	B			B	B	B		B	B	B	B	B	B	B	B	B			
Metal Stamp, Debossing	3.2.3.4	(d)	.025																																
(Nonvibrating)	3.2.4.1	(d)	.003	X	X	X	X	X	X	X				X	X	X			X			X													
(Vibrating)	3.2.4.2	(d)	.003	X	X	X	X	X	X	X				X	X	X			X			X													
Mechanical	3.2.4.3	(d)	.001	X	X	X	X	X	X	X				X	X	X			X			X	X	X		X	X		X	X		X			
Vibration Peen Manual	3.2.5.1	(d)	.006	B	B	B	B	B	B	B	B			B	B	B			B	B	B	B	B	B	B	B	B	B	B	B	B	B			
Vibration Peen Mechanical	3.2.5.2	(d)	.006	X	X	X	X	X	X	X	X			X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Engrave, Manual	3.2.7.1	(d)	.006 (l)	X			X			X	X	X			X	X	X			X	X			X		X	X		X	X		X			
Engrave, Mechanical	3.2.7.2	(d)	.006 (l)	X			X			X	X	X			X	X	X			X	X			X		X	X		X	X		X			
Brand	3.2.8	(d)	.010	X							X				X	X					X		X												
Drag Impression	3.2.10	(d)	.006 (l)	X	X	X	X	X	X	X	X			X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X			
Temporary Method																																			
Ink	3.2.6	---	---								X	X	X					X	X			X													
Paint	3.2.9	---	---					X	X													X													
Hot Stamp	3.2.11	---	---																																
See page C2 for symbol definitions.																																			

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