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1.0 PURPOSE

This specification establishes the requirements and methods of applying markings on parts for part number identification and other markings required to identify parts and assemblies and to indicate that inspection or processing operations have been performed.

2.0 APPLICATION

This specification is applicable to Military and commercial products for which Eaton is the design manufacturer or supplier, when so specified on drawings, specifications, contracts, purchase orders or other applicable documents.

2.1 Referenced Documents

MIL-STD-130	Identification Marking of U.S. Military Property.
ARP5316	Age Controls of Age Sensitive Elastomeric Materiel.
QCP-14.0	Indication of Inspection Status.
QCP 14.1	Part Identification and Traceability Standard

3.0 GENERAL REQUIREMENTS

3.1 Part Marking

Parts shall be marked in accordance with Table 1 of this specification and as specified on the drawing or VQR. In case of conflict, the drawing or VQR shall take precedence over this specification.

3.1.1 Prior approval of the method and/or location of part markings, when required by the purchase order, shall be obtained from the applicable Quality Assurance department when the method and/or location are not specified on the drawing or VQR.

3.1.2 Part Identification content shall be in accordance with Quality Control Procedure QCP 14.1.

3.2 Workmanship

Markings shall be clearly legible, complete, neat in appearance and uniform in size, spacing and alignment of characters. Markings shall be applied in a manner which will not damage the part. Parts damaged by marking are subject to rejection.

3.2.1 Ink stamped markings and/or cover coats shall be adherent and shall not be removable when vigorously rubbed simultaneously with the thumb and thumbnail. Slight smearing of the ink is permissible, provided the marking retains sufficient color contrast and is readily legible.

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3.3 **Methods of Marking**

The method of marking specified on the drawing shall be applied except that the allowable alternate method(s) shown in this specification may be used at the discretion of the supplier without prior approval by the purchaser.

3.3.1 The methods of marking and allowable alternate method(s) are as follows:

	METHOD	TYPES INCLUDED	ALLOWABLE ALTERNATE METHOD
3.3.1.1	STAMP	HAND STAMPING ROLL STAMPING	SCRIBE OR ETCH
3.3.1.2	SCRIBE	HAND SCRIBING ELECTRIC ARC SCRIBING VIBRATION SCRIBING	LASER ETCH DOT PEEN DOT IMPRESSION
3.3.1.3	ETCH	CHEMICAL ETCHING ELECTROLYTIC ETCHING ABRASIVE ETCHING LASER ETCHING	NONE
3.3.1.4	ENGRAVE	PANTOGRAPH ENGRAVING	NONE
3.3.1.5	INK APPLICATION	RUBBER STAMPING SILK SCREENING QUILL TYPE PEN FELT TIP MARKING PEN	REF. PARA. 6.1.2.1
3.3.1.6	MARK CONTAINER	HAND MARKING STENCIL MARKING PRINTED LABEL	NONE
3.3.1.7	MOLD	RAISED OR DEPRESSED CHARACTERS AS SPECIFIED ON THE DRAWING	NONE
3.3.1.8	CAST	RAISED CHARACTERS UNLESS OTHERWISE SPECIFIED ON THE DRAWING	NONE
3.3.1.9	TAG	HAND MARKING STENCIL MARKING	PRINTED LABEL

3.3.2 The methods of marking are described in detail as follows:

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3.3.2.1 **Stamp**

The work "stamp" indicates a marking which is an impression, cut, pressed, tamped, rolled or peened into the part with suitable tools. The depth of the impressions shall be 0.006 in. maximum, and all intersecting surfaces of the impressions shall have fillet radii of not less than 0.006 in. Care shall be exercised to prevent distortion while marking. This type of marking shall not be applied to parts having a hardness of more than Rockwell C-45 or equivalent.

3.3.2.2 **Scribe**

The word "scribe" indicates a marking which is an impression cut or scratched into the part by means of a suitable tool, operated by hand. The depth of the impressions shall be .006 in. maximum, unless otherwise specified elsewhere in this specification.

3.3.2.3 **Electric Arc Scribe**

The words "electric arc scribe" indicate a marking which is an impression made on the part by means of an electric arc between the part and a suitable scriber. The depth of the impressions shall be 0.006 in. maximum. This type of marking is suitable for parts too hard for metal stamping.

3.3.2.4 **Vibration Scribe**

The words "vibration scribe" indicate a marking which is an impression made on the part by a hand operated vibrating scriber. The depth of the impressions shall be .006 in. maximum unless otherwise specified elsewhere in this specification. Marking cannot be confined to a small area, but this type is particularly suitable for marking aluminum and magnesium alloys.

3.3.2.5 **Chemical Etch**

The words "chemical etch" indicate a marking which is an impression made on the part by the action of strong acid. A machine or rubber stamp may be used to form the characters, but care shall be exercised to prevent acid or fumes from damaging the part. The surface to be etched shall be clean; and after etching, the acid shall be neutralized and the surface oiled to prevent corrosion.

3.3.2.6 **Electrolytic Etch**

The words "electrolytic etch" indicate a marking which is an impression made on the part by the action of a suitable etching solution which forms part of an electrical circuit, on surfaces exposed through a mask or stencil. The depth of the impressions shall be 0.003 in. maximum. This method is suitable for plated and unplate metal surfaces, except that it shall not be applied to magnesium alloys. The surface to be etched shall be clean; and after etching, the solution shall be neutralized and the surface oiled to prevent corrosion.

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3.3.2.7 **Abrasive Etch**

The words "abrasive etch" indicate a marking which is an impression made on the part by blasting with wet or dry abrasive through a suitable mask. The depth of the impressions shall be 0.003 in. maximum. Parts shall be thoroughly cleaned after using this method of marking to remove all traces of the abrasive.

3.3.2.8 **Engrave**

The word "engrave" indicates a marking which is an impression cut or peened into the part by a suitable shaped tool. A rotating cutter or an axially vibrating needle is usually used with a pantograph transferring machine to guide the cutter. The depth of the impressions shall be 0.006 in. maximum. This type of marking is desirable where neatness, size and depth of the marking are to be controlled.

3.3.2.9 **Ink Stamp**

Ink markings may be applied using rubber or plastic stamps, quill type marking pens or Eaton materials lab approved felt tipped marking pens. The marking ink shall be resistant to water, aviation fuel, oil and cleaning solvents and shall be of a constrasting color to the color of the part being marked. Approved inks must contain no more than 250 ppm of Halogens, or pass temperature resistance test IAW Pratt & Whitney Spec. No. D50TF8.

3.3.2.9.1 The following commercial marking inks and marking pens have been tested by Eaton's Materials Lab and found to be acceptable for general usage. Other inks may have been tested and not listed.

- Mark – Tex 716 Action Marker, Black Fine Line
- Mark – Tex Q404 Black
- KING MARK Z-04, supplied by Marking Devices, Inc., Willoughby, OH.
- Felt Tipped Marking Pens, 716 Action Marker, and Action Marker Fine Line 33 High Purity Q-404 Black
- Felt Tipped Pens available thru Eaton office supplies store.
- Hysol M-O-N marking ink or other epoxy base inks. This ink is supplied by Hysol Division-Dexter Corporatioon, 15051 E. Don Julian Rd., Industry, California 91749.
- Other marking inks and/or pens may be used only after submitting the inks or pens to Eaton’s Materials Lab and obtaining approval for those inks from the lab. A complete list of all tested inks is available from Eaton’s Materials Lab, upon request.

The following guidelines apply when ink marking metal parts:

1) Ink(s) must be shaken or stirred adequately before pouring onto a stamp pad.

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2) The area ink stamp will be applied must be clean. Isopropyl Alcohol, freon or other cleaning solvents can be used to clean local area(s).

3) Ink stamp pad(s) must be labeled to identify the type of ink in the pad.

4) Ample curing time (1 to 2 hours) must be allowed before applying preservative oil or performing a cleaning operation.

5) Rubber marking stamps must be kept clean to assure legibility. A rag or tissue dampened with mineral spirits is recommended to clean rubber stamps.

6) Never mix different types of inks in stamp pad.

*CAUTION: When a permanent marking pen tip comes in contact with oil, it can no longer be used.

3.3.2.10 **Mark Container**

The words "mark container" indicate that the parts shall be collectively tagged or placed in an envelope or other suitable container. The tag, envelope or container shall be hand marked, labeled or stamped with a suitable waterproof ink or marking crayon.

3.3.2.11 **Tag**

The word "tag" indicates that the applicable part marking shall be applied to a suitable tag with waterproof ink or crayon. The tag shall be securely attached to each part so that, with normal handling, the tag will remain attached to the part during shipment and stocking.

3.3.2.12 **Mold**

The word "mold" indicates a part marking which is molded in or on the part as a result of a raised or depressed marking on the mold in which the part is formed. The thickness or depth and the height of characters shall be as specified on the drawing.

3.3.2.13 **Cast**

The word "cast" indicates a raised, unless otherwise specified on the drawing, marking which is cast on the part as a result of a raised marking on the pattern from which the cast part is made.

3.3.2.14 **Laser Etch**

The words "Laser Etch" indicate a marking which is an impression made on the part 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 or drawing. The depth of the impressions shall be 0.0005 inch maximum. The following parameters shall be process controlled as a minimum:

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- Laser workstation (identification of laser marking facility)
- Lens focal length (in mm/inches)
- Feed rate (in mm per sec/inches per min)
- Frequency (in Hz)
- Laser power (or a proportional value)
- Marking frequency (repetition of marking/number of passes)

3.3.2.15 **Dot Peen**

The words "dot peen" indicate an electronically controlled marking system which utilizes alpha-numeric characters of various sizes and depths. All marks are produced by a carbide stylus which is actuated by an electronic solenoid. Inscriptions can be marked in a linear or circular mode.

3.3.2.16 **Dot Impression**

The words "dot impression" indicate an electronically controlled marking system which utilizes alpha-numeric characters of various sizes and depths. All marks are produced by a series of nine carbide stylus which are actuated by an electronic solenoid.

3.4 **Repair of Markings**

Markings incorrectly applied or damaged during subsequent manufacturing may be repaired. Where practicable, a suitable repair or touch-up procedure may be used which will produce a legible marking which closely resembles the original marking in appearance and size. When this procedure is not practicable, the original marking shall be obliterated and the part shall be remarked by the specified method as near the original marking as possible.

4.0 **PART NUMBER MARKING**

4.1 **Finished Parts**

The part number, which is the engineering drawing number, unless otherwise specified, shall be applied to each part, using the method of marking and location specified on the drawing or an alternate method authorized by this specification.

4.1.1 When several parts are depicted on a single tabulated drawing, the dash (suffix) number of the part shall be applied as part of the part number.

4.1.2 The drawing change letter to which the part was manufactured, as shown on the drawing print or supplement document, preceded by the symbol “REV”, “CHG”, or “LCL” (latest change letter) shall be applied at the right of the part number. For drawings with no revision history, the initial release identifiers either “NC” or “-“ shall follow the symbol. The choice of either “NC” or “-“ will be determined in accordance with the drawing identification. When no drawing change letter is shown on the drawing, the symbol shall be followed by “NC”.

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4.1.3 When space limitations prevent application of the complete part number marking on one (1) line, the change letter, with the symbol "CHG", shall be applied above or below the part number.

4.1.4 Characters used in part marking shall be vertical capitals and numerals of Gothic style, unless otherwise specified on the drawing. The height of the characters shall depend on the size of the part and the area available for marking, except that the height shall be between 1/16 inch (min.) and 1/2 inch (max.), unless otherwise specified on the drawing.

4.1.4.1 When metal stamping is applied, the height of the characters shall not exceed 1/8 inch, unless otherwise specified on the drawing.

4.1.5 When lot number (batch number, work order number) is required, the number shall be prefaced by “L”, “L-“, “Lot” or “Lot-“.

4.2 **AN- and MS- Standard Hardware Items**

The container in which the parts are supplied shall be ink marked with the AN- or MS-part number, including the applicable dash number and the Eaton reference number shown on the purchase order, preceded by the symbol "Eaton NO".

4.3 **Vendor Items**

The design manufacturer's part number shall be marked on the part, if practicable, or on the container. The Eaton control drawing number and change letter to which the part was manufactured shall be marked on the container, preceded by the symbol "Eaton NO.".

4.4 **Nonferrous and Ferrous Castings**

4.4.1 Part markings shall be cast on castings only when so specified on the drawing.

4.4.2 The cast part number marking shall consist of raised characters, unless otherwise specified on the drawing. The height of the characters shall be 3/16 inch minimum and 1/2 inch maximum, depending on the size of the part. The thickness of the characters shall be 1/32 inch minimum and 1/16 inch maximum.

4.4.3 When the finished part number is other than the casting part number, the casting part number shall be ink stamped or cast on a surface which will be removed by machining.

4.5 **Casting Serialization**

When specified on the drawing or VQR, each part shall be identified by a serial number.

Serial numbers: Serial number shall start with "S/N", then followed by the first letter of vendors name followed by number consecutively without duplication per part number with no concern to P.O. unless otherwise specified on the purchase or manufacturing order.

4.5.1 When ever possible, all new casting part numbers, in the area designated for the serial number marking shall have "S/N" and the first letter of the vendors name cast on the part(s).

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4.5.1.1 Castings may be serialized with any of the following methods: dot peen, dot impression, hand engraved, engraved, laser etch or vibration scribe.

4.5.1.2 Sand casting serial number marking shall be approximately 1/4" to 1/2" high. Marking depth to be .006 to .015 maximum.

4.5.1.3 Investment casting serial number shall be approximately 1/8" to 1/4" high. Marking depth to be .006 maximum.

4.5.1.4 If for any reason, the foundry is having difficulty marking the part legibly because of the designated location, contact Eaton.

4.5.2 Casting serial numbers shall be traceable to the melt and heat treat lot number on the certification.

4.5.3 **Machined Castings**

4.5.3.1 When the location of the finished part number is not specified on the drawing, the supplier shall obtain location approval from the purchaser, prior to applying the part number marking to the casting. The finished part number should be located where, if possible, it will be visible after assembly.

4.5.3.2 The drawing change letter to which the finished part was manufactured, as shown on the applicable drawing print or supplemental document, shall be marked to the right of the part number.

4.6 **Ferrous and Nonferrous Forgings**

The forging part number shall be applied by stamping or scribing on a surface which will be removed by machining.

4.6.1 The forging heat code and supplier's identification shall be stamped or otherwise permanently marked on an unmachined surface when specified on the purchase order.

4.7 **Barstock**

4.7.1 Each straight bar 0.500 in. (12.70 mm) and over in diameter or least width of flat surface shall be marked in a row of characters recurring at intervals not greater than 3 ft (914 mm) with material specification, heat number, and manufacturer's identification. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be capable of being removed in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the material or its performance and shall be sufficiently stable to withstand normal handling.

4.7.2 Straight bars less than 0.500 in. (12.70 mm) in diameter or least width of flat surfaces shall be securely bundled and identified by a metal or plastic tag embossed with the purchase order number, material specification, heat number, normal size, and manufacturer's

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identification and attached to each bundle or shall be boxed and the box marked with the same information.

4.7.3 Wrought aluminum bars do not require heat numbers, unless otherwise specified.

5.0 CURE DATE MARKING

5.1 When specified on the drawing, parts made from synthetic rubber shall be marked with the rubber cure date, in accordance with ARP 5316.

5.2 The cure date marking shall be shown on the part above or below the part number marking. The marking shall be ink stamped with contrasting color ink, conforming to ink specified in paragraph 4.3.2.9.1. When the parts are unsuitable for individual marking, the cure date shall be ink marked on the container.

5.3 For purposes of cure date marking, each year is divided into four calendar quarters.

5.3.1 The cure date marking symbol shall consist of (1) the number of the calendar quarter in which the part was cured, (2) the letter "Q" and (3) the last two digits of the year. For example, a part cured in January, February or March of 1986 shall be marked "1Q86".

5.3.2 Synthetic rubber parts manufactured during any given quarter will not be considered one (1) quarter old until the end of the succeeding quarter. For example, parts cured during the first quarter of 1986 would be one (1) quarter old at the end of the second quarter, June 30, 1986.

5.4 Synthetic rubber parts subject to cure date marking shall be rejected, if at the time of their arrival at Eaton receiving inspection, the cure date is illegible or does not comply with this specification.

6.0 PROCESS AND INSPECTION MARKING

6.1 Recording

In order to record compliance with process and inspection procedures, authorized symbols, as applicable, shall be applied to each part upon completion of the specified requirement.

6.1.1 The symbol shall be applied to a unmachined surface, or after machining, so that the symbol will be visible on the finished part. The symbol shall be ink stamped and located as near as practicable to the part number marking unless otherwise specified on the drawing or VQR.

6.1.2 When a subsequent operation or handling removes or obliterates the marking, arrangements shall be made for re-application of the original symbol marking prior to assembly of the part.

6.1.2.1 Any in process inspection operation requiring acceptance evidence (ink stamp) on part <u>may</u> be lightly vibro etched or scribed. The marking depth should not exceed .010 maximum. This action is required because subsequent processing obliterates and/or removes the ink stamp. Non machined cast surfaces only.

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6.1.3 When the part is not suitable for individual process and inspection marking, the symbols shall be ink stamped on a tag, securely attached to the part, or on the container in which the part is shipped or stocked; however, prior approval by the applicable Eaton Quality Control department shall be required.

6.1.4 Process and inspection stamps shall be applied to materials, parts, assemblies and finished products for the indication of inspection status. All marking shall be in accordance with the requirements of Quality Control Procedure QCP-14.0. Slight variations from the Inspection and Process stamps are allowable provided the symbol is unmistakably recognizable for the process.

6.1.5 The Visual, Dimensional and Functional Inspection Acceptance stamp (reference QCP-14.0) shall be applied to all items of the inspection lot accepted by the Inspection Department regardless of whether the lot was sample inspected or subject to 100% inspection. All parts repaired to an Standard Repair (SR) within the inspection lot shall be identified as required by Eaton Quality.

6.2 **Inspection**

Inspectors or certified operators shall ascertain that the proper characters have been applied and that the markings meet the requirements of this specification.

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Standard Part Marking Table #1: Application Method by Part Type

Part Type	Acceptable Method(s)							Location
	Ink Stamp/Quill	Electro-Chem. Etch	Vibro-Etch	Engrave	Laser Etch	Tag Parts	Mark Container	
Pump Assemblies	X			X	X			On Nameplate or as Specified on Print or VQR
Bearings – Purchased	X	X	X		X			As specified on print, VQR or SOP 52-08-0000-00-060
Bearings – Eaton Fab.	X	X	X		X			As specified on print, VQR or SOP 52-08-0000-00-060
Castings/Forgings			Or Integrally Cast/Forged X	X	X			Near Nameplate or as Specified on Print or VQR
Gears		X			X			On Non-Working Flank or as Specified on Print or VQR
Machined Housings	X		X	X	X			Near Serial Number or as Specified on Print or VQR
(Carbon Shaft) Seals	X	X	X	X	X		X	On O.D. or as Specified on Print or VQR
Shafts	X	X						On O.D. or as Specified on Print or VQR
Stators/Rotors	X		X		X		X	On Both End Caps – Rotor, On O.D. – Stators, or as Specified on Print or VQR
Connectors (Elec.)	X	X	X	X	X		X	On Flange or as Specified on Print or VQR
(Leads) Connector Cables	X	X				X	X	On Container or as specified on Print or VQR
Indicators	X	X	X	X	X		X	On Flange or as Specified on Print or VQR
Impeller Nuts	X	X			X			On Nonbearing face or as Specified on Print or VQR
Rotating Rings	X	X			X			On O.D. or as Specified on Print or VQR
Filters	X	X	X	X	X		X	On End Cap or as Specified on Print or VQR
Lube Flow Screens	X	X	X	X	X		X	On End Cap or as specified on Print or VQR
Relief Valve Bodies/Assemblies	X	X			X			Bodies on O.D./Ass'ys on End or Flange or as Specified on Print or VQR
O-rings							X	On Container or as Specified on Print or VQR
Cements, Epoxys, and Compounds							X	On Container or as Specified on Print or VQR
Misc. Machined Parts	X	X			X			As Specified on Print or VQR
Parts Too Small to Mark* *(Determined by Quality Planning)							X	On Container or as Specified on Print or VQR

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