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TITLE

MARKING OF ELECTRICAL AND MECHANICAL ITEMS

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MINOR CHANGES AND/OR ADDITIONS ARE INDICATED.

THIS SPECIFICATION SUPERSEDES THE FOLLOWING SPECIFICATIONS.

AA0104-002	dated 03-04-80	Revision Letter G
AA0104-008	dated 08-16-73	Revision Letter D
AA0104-010	dated 11-08-66	Revision Letter C
AA0104-014	dated 08-23-63	Revision Letter A
AA0104-015	dated 04-14-61	
LA0104-015	dated 04-14-61	
MA0104-015	dated 01-09-65	Revision Letter A
AA0104-023	dated 05-15-67	Revision Letter A
ST0104AA0025	dated 03-27-67	
ST0104AA0029	dated 05-19-71	Revision Letter A
AA0108-024	dated 03-03-76	Revision Letter H

WARNING

This specification does not require but allows the use of Class I Ozone Depleting Substances (ODS). Sub-tier documents invoked by this specification may require ODS use and should be investigated prior to use. The user is cautioned to check contractual requirements prior to the use of ODS.

ENGINEERING RELEASE EDC

RELEASE: 11/25/02

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1. SCOPE

1.1 Scope. This specification covers processes for applying identification markings on parts and assemblies designed by The Boeing Company, Anaheim.

1.2 Inclusions. Requirements once covered in the following specifications have been incorporated in the noted paragraphs:

AA0104-002 (INACTIVE FOR DESIGN)	Marking of (TFE) Teflon and (TFE) Teflon Impregnated Glass Braid Covered Wire (3.4.7.1)
AA0104-008 (INACTIVE FOR DESIGN)	Marking; Screen Stencil Method (3.4.4)
AA0104-010 (INACTIVE FOR DESIGN)	Impression Marking Nylon Jacketed Wire and Cable (3.4.7.1, 5.2)
AA0104-014 (INACTIVE FOR DESIGN)	Marking of High Reliability Transformers Inductors and Reactors (3.4.1.1, 3.4.2.1, 3.4.3.1, 3.4.5, 3.4.8)
AA0104-015 (INACTIVE FOR DESIGN)	Marking of Teflon (FEP) Insulated Wire and Cable (3.4.7.1, 5.2)
LA0104-015 (INACTIVE FOR DESIGN)	Marking of Teflon Insulated Cable (3.4. (3.4.7.1, 5.2)
MA0104-015 (INACTIVE FOR DESIGN)	Markings, Engraved, Application of (3.4.11)
AA0104-023 (INACTIVE FOR DESIGN)	Marking, Identification, Multiconductor and Coaxial Cables (3.4.7.3)
ST0104AA0025 (INACTIVE FOR DESIGN)	Marking of Polyimide and Polyimide/Teflon Insulated Hook-up Wire and Cable (3.4.7.2, 5.2)
ST0104AA0029 (INACTIVE FOR DESIGN)	Wire Marking Using a Disc Type Automatic Marker (3.4.7)
AA0108-024 (INACTIVE FOR DESIGN)	Application of Protective Coating to Markings(3.3.3.5, 5.2)

1.3 Exclusions. This specification does not include detail fabrication and application of nameplates or requirements for decalcomanias which are covered in the following specifications:

AA0104-012	Identification Plates and Decalcomanias, Application of
AA0104-016	Nameplates, Etched, Rigid Metal, Fabrication of
AA0104-017	Nameplates, Aluminum Foil, Photo-Etched, Adhesive Bonded; Fabrication of
AA0104-018	Nameplates, Adhesive-Backed, Plastic, and Decalcomanias; Fabrication of

1.4 Marking process selection. The drawing usually defines the appropriate marking process for each part. When this selection has not been made, selection may be based on the guidelines presented in 5.1.

1.5 Justification. This specification controls the procedures necessary to conform to the requirements of MIL-STD-1285 and MIL-STD-130.

2. APPLICABLE DOCUMENTS. The following documents, of the latest issue in effect except as otherwise indicated, form a part of this specification to the extent specified herein. In the event of conflict between documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

2.1 Government documents

SPECIFICATIONS

Federal

A-A-208	Ink, Marking, Stencil, Opaque (Porous and Non-Porous Surfaces)
A-A-56032	Ink, Marking, Epoxy Base
TT-N-95	Naphtha; Aliphatic
TT-E-527	Enamel, Alkyd, Lusterless, Low VOC Content
*TT-E-529	Enamel, Alkyd, Semigloss, Low VOC Content
TT-I-735	Isopropyl Alcohol

2.1 (Continued)

Military

MIL-H-5606	Hydraulic Fluid, Petroleum Base; Aircraft, Missile and Ordnance
MIL-C-15074	Corrosion Preventive, Fingerprint Remover
MIL-I-19166	Insulation Tape, Electrical, High-Temperature, Glass Fiber, Pressure-Sensitive
MIL-T-81533	Trichloroethane, 1,1,1, (Methyl Chloroform) Inhibited, Vapor Degreasing
MIL-W-22759	Wire, Electrical, Fluoropolymer Insulated Copper or Copper Alloy

STANDARDS

Federal

FED-STD-595	Colors Used in Government Procurement

Military

MIL-STD-130	Identification Marking of U. S. Military Property
MIL-STD-1285	Marking of Electrical and Electronic Parts

NOTE: ASTERISK INDICATES THIS SPECIFICATION (or standard) HAS BEEN CANCELED BY THE ISSUING AGENCY. COPIES ARE AVAILABLE FROM THE PROCURING ACTIVITY TO SUPPORT ITS CONTINUED USE AS SPECIFIED HEREIN.

2.1 (Continued)

Society of Automotive Engineers - Aerospace Material Specification (SAE)

SAE-AMS-DTL-23053/5	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Flexible, Crosslinked
SAE-AMS-DTL-23053/6	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Semi-Rigid, Crosslinked
SAE-AMS-DTL-23053/8	Insulation Sleeving, Electrical, Heat Shrinkable, Polyvinylidene Fluoride, Semi-Rigid, Crosslinked

American Society for Testing and Materials

ASTM D 740	Standard Specification for Methyl Ethyl Ketone

OTHER PUBLICATIONS

Handbooks

H4-1	Federal Supply Code Identification Numbers

2.2 Non-government documents

SPECIFICATIONS

The Boeing Company

ST0106AA0040	Bonding with Room-Temperature-Vulcanizing Silicone Rubber Adhesive
AA0109-016	Chemical Films, Application of, to Aluminum Alloys
AA0110-027	Solvent Vapor Degreasing of Electronic Assemblies
AA0110-028	Degreasing, Solvent Vapor
AA0117-004	Handling of Flammable and Dangerous Liquids and Chemicals
AB0120-011	Adhesive, Thermosetting, Epoxy Resin
AB0120-057	Adhesive Bonding and Sealing Compound, Single Component, Silicone Rubber Base
AB0125-041	Coating, Epoxy, Clear, Air-Drying
AB0190-001	Identification Plate, Aluminum Foil, Adhesive-Backed

2.2 Non-government documents (continued)

SPECIFICATIONS

AB0190-004	Plastic Film: Polyester, Pressure-Sensitive-Adhesive
AB0190-006	Identification and Information Plates, Metal, Rigid
AB0190-011	Markings, Identification, Transferable
AB0190-015	Labels, Polyester, Pressure-sensitive Adhesive, Laser Imprintable
AB0210-008	Solvent, Petroleum
AB0290-002	Ink, Rubber Stamping (Non-Etching)
AB0290-003	Ink, Etching, Acid
IID 171-0189	Labels, High Temperature, Polyimide, Pressure-Sensitive-Adhesive

OTHER PUBLICATIONS

AH-PEO-13	Employee Certification/Qualification Handbook Specialty Manual
S88-331/100	Employee Certification/On-The-Job Qualification Training

3. REQUIREMENTS. In the event of conflict between the requirements of this specification and drawings calling out this specification, the requirements of the drawing shall take precedence.

3.1 Equipment. The following equipment shall be used. Equipment which produces equivalent or superior results may be used in lieu of that which is listed with written approval from the responsible Boeing - Anaheim Materials and Processes engineer.

3.1.1 Offset printing

Printer, offset, Gravure R4/R7334, Eastern Marking Machine Corp., Hempstead, NY

Stamp offset printer, Markem Model 135A, Markem Corp., Keene, NH

3.1.2 Rubber stamping

Curing oven

Drying oven

Infrared heater

Ink pads

Rubber stamps

3.1.3 Stenciling

Stencils

3.1.4 Silk screening

Screens

UV light source

Vacuum printer

3.1.5 Hand pen

Pen, Rapidograph

3.1.6 Transfers

(None)

3.1.7 Hot impression stamping

Kingsley stamping machine Nos. KW7, KWE7, KW6, KW4A, ATE-6B, M100BA, Kingsley Machine Co., Hollywood, CA

TAB engineering wire marking machine: Models MA-200-ED, DD, -CD, TAB Engineering Corp., Sylmar, CA

Eubanks autotab wire marking system, Model 77610
Eubanks Engineering Co., Monrovia, CA

Marking type curved face, and vertical reading, Grade X,
Kingsley Machine Company, Hollywood, CA

Wet Hypot tester, Associated Research Inc., Lake Bluff, IL

High frequency sine wave spark tester, Model HF-20E
Clinton Instrument Co., Clinton, CT

3.1.8 Label printing. Label printing includes printing on labels, sleeves, and markers by either computerized printing, thermal transfer printing, barcode printing, or xerographic printing.

3.1.8.1 Computerized printing

3.1.8.1.1 Computer printers

EPC Microlabeler, EPC Identification Systems, Santa Rosa, CA

Epson printer, Epson America, Inc., Torrance, CA

Brady printer, Brady USA, Inc., Milwaukee, WI

Okidata Microline 380, Okidata, Mount Laurel, NJ

Other equivalent computer printers

3.1.8.1.2 TMS System 90

IBM PC or compatible computer

IBM Wheelwriter typewriter

Raychem Thermofit TMS System 90 software, Raychem Corp., Menlo Park, CA

Raychem TMS permatizer, Raychem Corp., Menlo Park, CA

3.1.8.1.3 Laser printer

Hewlett Packard Laserjet or equivalent commercial laser printers

3.1.8.2 Thermal transfer printing

Critchley HIS System thermal transfer printer and associated software, Critchley, Inc., Salt Lake City, UT

Brady thermal transfer printer and associated software, W. H. Brady Co., Milwaukee, WI

IBM PC or compatible computer

3.1.8.3 Barcode printing

Intermec 8404 high density barcode printer, Intermec Technologies Corp., Everett, WA

EPC Microlabeler, EPC Identification Systems, Santa Rosa, CA

Epson printer, Epson America, Inc., Torrance, CA

Brady printer, Brady USA, Inc., Milwaukee, WI

Other equivalent barcode printers

3.1.8.4 Xerographic printing

Royal 3302 MR copier, Konica Business Machines USA, Inc., Windsor, CT

Other equivalent copiers

3.1.9 Electrochemical etching

Electrochemical etcher, Electromark Div., IMG of Utica Inc., Utica, NY

Marking unit, Lectroetch Co., Sheffield Village, OH

Model 150, Monode Marking Products, Inc., Mentor, OH

No. 100 "Producer" and "Supervisor" units; Electro-Chem Etch Metal Markings, Inc., Brea, CA

Mark 300-A, Marking Methods, Inc., Alhambra, CA

3.1.10 Electric arc pencil

Electric arc pencil

3.1.11 Engraving

Engraving machine

3.1.11.1 Laser engraving/marking

Laser engraving/marking machine

3.1.12 Vibration tooling

Vibro-Graver, Burgess Vibrocrafters, Inc., Grayslake, IL

3.1.13 Cold impression stamping

3.1.13.1 Manual stamping

Stamps, metallic

3.1.13.2 Computerized stamping

Schmidt 990SST programmable nameplate marker and associated software, Geo. T. Schmidt, Inc., Niles, Ill

IBM PC or compatible computer

3.1.14 Quality assurance test equipment

a. 10-power magnification loupe with measurement grid

b. Hypot tester

3.2 Materials. The following materials shall be used. Materials which produce equivalent or superior results may be used in lieu of those which are listed after obtaining written approval from the responsible Boeing - Anaheim Materials and Processes engineer.

3.2.1 Identification devices (see 5.15.3)

Adhesive, Silicone; AB0120-057

Identification and information plates, metal, rigid; AB0190-006

Identification plate, aluminum foil, adhesive-backed; AB0190-001

Insulation tape, electrical, high-temperature, glass fiber, pressure-sensitive, MIL-I-19166

Labels, high temperature, polyimide, pressure-sensitive adhesive; 171-0189

Labels, polyester, pressure-sensitive adhesive, laser imprintable, AB0190-015

Label, silicone rubber

Plastic film: polyester, pressure-sensitive adhesive; AB0190-004

Sleeving, heat-shrinkable, flexible polyolefin, SAE-AMS-DTL-23053/5, Class 1

Sleeving, heat-shrinkable, semi-rigid polyolefin, SAE-AMS-DTL-23053/6, Class 1

Sleeving, heat-shrinkable, semi-rigid polyvinylidene fluoride, SAE-AMS-DTL-23053/8, all classes

Tags, metal or plastic

Tape, polyester (Mylar)

Ties, nylon

3.2.2 Surface preparation (see 5.15.2)

Abrasive sheets, 400 to 600 grit

Isopropyl alcohol, TT-I-735, Grade A and Grade B

Naphtha, TT-N-95, Type II or AB0210-008, Type I

Resin coating, AB0120-011, Type II

Tissues

Wiping cloths

3.2.3 Protection

Coating, clear epoxy; AB0120-011, Type II, Class 2

Coating, clear epoxy; AB0125-041

Coating, clear; Humiseal 1B12; Columbia Chase Corp.

Film, clear, pressure-sensitive; AB0190-004, Type III

3.2.4 Offset printing

Ink; 1001; Pannier Co., Pittsburgh, PA

Ink; 7251 FRS; Markem Co., Keene, NH

Ink; 7224 Markem Co., Keene, NH

3.2.5 Rubber stamping

Isopropyl alcohol, TT-I-735

Naptha, TT-N-95, Type II or AB0210-008, Type I

Ink, 1001; Pannier Co., Pittsburgh, PA

Ink, 6646-R; Markem Co., Los Angeles, CA

Ink; AB0290-002, Type I, Classes 1 through 4

Ink; AB0290-002, Type II, Classes 1 through 6

Ink; AB0290-002, Type III

Ink, acid-etching; AB0290-003

Ink, 8655, Markem Co., Keene, NH

Ink; MIL-I-43553

Thinner; AD2001 or butyl cellosolve acetate, AD2003 (T-1) and RE180

3.2.6 Stenciling

Enamel; TT-E-529

Ink, 1001; Pannier Co., Pittsburgh, PA

Ink, 6646-R; Markem Co., Los Angeles, CA

Ink; AB0290-002, Type I, Classes 1 through 4

Ink; AB0290-002, Type II, Classes 1 through 6

Ink; AB0290-002, Type III

Ink, acid-etching; AB0290-003

Ink, 8655; Markem Co., Keene, NH

3.2.6 (Continued)

Ink; A-A-208

Ink; A-A-56032

3.2.7 Silk screening

Screen; Corrosion resistant steel mesh, Type 304, #230 to 280; commercial, Nylon mesh, #125 to 173; commercial, Silk mesh, 16XX; commercial

Deionized or distilled water, containing no more than 25 ppm total solids

Hydrogen peroxide, 30%, commercial

Ulano HI-FI developer; Parts A and B, Ulano Corp., Brooklyn, NY

Transfer film (presensitized photo stencil film), Five Star, Autotype USA, Elk Grove Village, IL

Ink paste, 59-111 Black; NAZDAR

Ink paste, 59-112 White; NAZDAR

3.2.8 Hand pen

Ink, AB0290-002, Type I, Class 2

Ink, India; Rapidograph

3.2.9 Transfers

Transfer sheet; AB0190-011

Polyester ribbon, carbon coated; commercial

3.2.10 Hot impression stamping. All GUARDS should be secured in place while the marking machine is in operation so that the operator will be protected from moving parts and hot surfaces.

Marking foil, K-520, K-30; Kingsley Machine Co., Hollywood, CA

Marking foil; TB-0014 (black) and TBW016 (white), high temperature types. TB-0123 (black) low temperature, TAB Engineering, Sylmar, CA.

Marking foil; 66620-26, for Teflon wire on Eubanks wire marker

3.2.11 Label printing

3.2.11.1 Computerized printing

3.2.11.1.1 Computer printers

EPC-RI indelible ink ribbon, EPC Identification Systems, Santa Rosa, CA

R2070 Brady fabric ribbon, Brady USA, Inc., Milwaukee, WI

Brady series 2000 nonsmear fabric ribbon, Brady USA, Inc., Milwaukee, WI

Critchley 1896 0000 black high performance dot matrix ribbon, Critchley, Inc., Salt Lake City, UT

Other equivalent ribbons for the specific computer printers

3.2.11.1.2 TMS System 90

Thermofit TMS marker sleeves, Raychem Corp., Menlo Park, CA

Thermofit TW-TMS marker sleeves, Raychem Corp., Menlo Park, CA

Thermofit TMS-WM wraparound markers, Raychem Corp., Menlo Park, CA

3.2.11.1.3 Laser printers

Laser imprintable polyester labels, AB0190-015

3.2.11.2 Thermal transfer printing

Critchley 1900 0000 thermal transfer ribbon, Black Type I, Critchley, Inc., Salt Lake City, UT

Critchley Thermal HSI wire marker heat shrink sleeves, Critchley Inc., Salt Lake City, UT

Brady polyimide labels, Type B-426, W. H. Brady Co., Milwaukee, WI

3.2.11.3 Barcode printing

R114000 Intermec nonsmear barcode ribbon, Intermec Technologies Corp., Everett, WA

Other equivalent ribbons for the specific barcode printers

3.2.11.4 Xerographic printing

3302 MR copier toner, Konica Business Machines USA, Inc., Windsor, CT

Other equivalent toners for the specific copiers

3.2.12 Electrochemical etching

Isopropyl alcohol, TT-I-735

Naphtha, TT-N-95, Type II or AB0210-008, Type I

Corrosion preventive; MIL-C-15074

Electrolyte

Neutralizer/cleaner

3.2.13 Electric arc pencil

(None)

3.2.14 Engraving

Enamel; TT-E-527

3.2.14.1 Laser engraving/marking

(None)

3.2.15 Vibration tooling

(None)

3.2.16 Cold impression stamping

3.2.16.1 Manual stamping

Lacquer-Stik; LA-CO Industries Inc., Elk Grove Village, IL

Foil and metal nameplates

3.2.16.2 Computerized stamping

Foil and metal nameplates

3.2.17 Quality assurance tests

Adhesive tape 3M #250

Axarel 36, Petroferm Inc., (Commercial)

Eraser, Magic Rub 1954, Faber Castell Co.

Isopropyl alcohol; TT-I-735

Hydraulic fluid; MIL-H-5606

Naphtha; TT-N-95, Type II or AB0210-008, Type I

Methyl ethyl ketone (MEK); ASTM D 740

Orangewood stick

3.2.17 (Continued)

Swab, cotton

Trichloroethane, 1,1,1; MIL-T-81533 (ODS)

Water, deionized, 50,000 ohm-cm minimum

3.3 General requirements

3.3.1 Safety and environmental

3.3.1.1 Hazardous materials. All hazardous materials shall be handled, used, stored, and disposed of in a manner compliant with AA0117-004 and local, state, and federal regulations.

3.3.1.2 Volatile organic compounds. All materials, including the inks, coatings or other marking materials, thinners, solvents including equipment cleaning chemicals that contain volatile organic compounds (VOCs) or other required air contaminates shall be used (this includes application and curing operations), stored and disposed of in a manner compliant with local air quality management districts (or pollution control agencies) and other local, state, and federal regulations.

3.3.1.3 Guards. All guards shall be secured in place while the marking machine is in operation so that the operator will be protected from moving parts and hot surfaces.

3.3.2 General marking requirements

3.3.2.1 Marking of parts fabricated in-house. Marking of electrical and mechanical parts, sub-assemblies and minor assemblies which are both designed and manufactured by Boeing - Anaheim based divisions (Cage Code 94756) shall be in accordance with the following information:

a. Parts: 94756-(part number) and serial number when applicable.

b. Minor assembly or sub-assembly; 94756 ASSY (Part Number). Identifying parts to become permanent in an assembly fabricated in the same department by use of a 93H tag shall be allowable. There shall be a maximum of one tag per part.

c. When marking requirement is not specified, the information shall be in accordance with 3.3.2.1.

3.3.2.2 Marking of parts fabricated outside. When Boeing - Anaheim-designed parts, sub-assemblies and minor assemblies are manufactured by others, the CAGE Code (Handbook H4-1), prefixed by "MFR," shall be marked below the marking specified in 3.3.2.1. If it is not possible to show the manufacturer's CAGE Code, the manufacturer's name or trademark shall be shown

Example: 94756-12345-301-11

MFR 20001 or TM

3.3.2.3 Location. Markings shall be located in an area that is readable after assembly or installation. Markings shall be placed on a surface such that the marking is clear. When items cannot be physically marked because of space limitations or because marking has a deleterious effect, the information shall be either placed on a tag attached to the item or shall be marked on the container.

3.3.2.4 Identification (I.D.) plates. The markings applied to I.D. plates shall include item name and number, type designation, serial number, contract number and applicable CAGE Code.

3.3.2.5 Identification of assemblies. The assembly number shall be applied after finish processing (e.g., painting, plating).

3.3.2.6 Restoration of marking. In the event that markings are lost during fabrication, assembly numbers, detailed part numbers and component numbers shall be remarked.

3.3.2.7 Marking on magnesium and beryllium

3.3.2.7.1 Magnesium alloys. All magnesium alloy parts shall be marked with the word "Magnesium" applied to a minimum of one and a maximum of four sides.

3.3.2.7.2 Beryllium. All beryllium parts shall be marked with the word "Beryllium". Beryllium parts shall be placed in a container labeled "Beryllium" when size, shape or design restrictions conflict with marking.

3.3.2.8 Variable additions. When design requirements already include non-variable identification on parts specified by the parts list, only remaining variable information shall be required to be used.

3.3.3 Usage of identification devices

3.3.3.1 Tags. Tags shall be used when no alternative method of identification markings can be used (e.g., optical parts or plated hardware in which all sides and surfaces are critical).

3.3.3.1.1 Tag removal. Parts installed in an assembly shall have tags removed during processing.

3.3.3.1.2 Small items. All small items shall be packaged or bundled and identified by lot tagging. For storage and handling of quantities of small items, each container shall contain a minimum number of tagged items based on the following schedule:

1 piece	- 1 tag	200 to 499 pieces	- 6 tags
2 to 25 pieces	- 2 tags	500 to 999 pieces	- 8 tags
26 to 50 pieces	- 3 tags	1000 pieces and over	- 10 tags
51 to 199 pieces	- 4 tags		

3.3.3.2 Identification ties. Marked ties shall be used to identify cables, harnesses, wire bundles and connectors.

3.3.3.3 Silicone labels. When size, shape and design restrictions conflict with the marking of silicone rubber parts, then the marking shall be applied to a 0.020 ± 0.010 inch thick silicone rubber label in accordance with 3.4.2.3. Marked labels shall be bonded to the parts with silicone adhesive (AB0120-057) in accordance with ST0106AA0040.

3.3.3.4 Glass fiber tape. Unmarked Teflon insulated cables in fielded systems which operate at 550°F or lower and which cannot be removed from the system shall be identified by pressure sensitive glass fiber tape, MIL-I-19166, 0.010 ± .001 inch thick which has been marked. See 5.13 for recommended practices.

3.3.3.5 Heat shrinkable sleeving. Cables which may be damaged by heating, stamping or indentation attendant to hot impression stamping shall be identified by marked, heat-shrinkable sleeving: SAE-AMS-DTL-23053/5, Class 1, white or black; SAE-AMS-DTL-23053/6, Class 1 clear; or SAE-AMS-DTL-23053/8, all classes.

3.3.4 Process requirements

3.3.4.1 Surface preparation. Surfaces shall be cleaned prior to marking parts. Recommended cleaning methods are contained in 5.2.

3.3.4.2 Characters, figures and symbols. Type without serifs (sans serif), such as "Gothic" or Futura," shall be used. Capital letters and Arabic numerals shall be used. The characters on identification plates shall be 0.065 ± 0.010 inch high with a maximum of 17 characters per inch. For rub-on transfer sheets, characters smaller than 0.050 inch stroke width or 20 dpi shall be used. The characters of cold impression stamps shall have rounded edges. Unless otherwise specified, the minimum radius shall be 0.005 inch.

3.3.4.3 Touch-up. Voids or discontinuities in the marking or protective coating shall be permitted. (See 5.1.2.5.)

3.3.4.4 Marking protection. The following markings shall be protected with a protective coating (3.3.4.4.1):

a. Ink, AB0290-002, Type I, all classes

b. Ink, AB0290-002, Type II, Classes 1 and 2

c. Ink, AB0290-002, Type III

d. Ink, AB0290-003

e. Ink, Markem #8655

f. Ink, Pannier 1001

g. Ink, Rapidograph India

h. Transfers, AB0190-011

i. Carbon ribbon

j. Enamel, TT-E-529

k. Lacquer-Stik

3.3.4.4.1 Protective coating. The protective coating material shall be AB0120-011, Type II, Class 2 or AB0125-041. Coating material shall be cured. See 5.3.2 for recommended methods of application and curing.

3.3.5 Validation methods. Unless otherwise specified in the detailed requirements, objective evidence of accomplishment of the requirements for this specification shall be provided by one of the following methods.

3.3.5.1 Build records. Record objective evidence on build records.

3.3.5.2 Log sheets. Record objective evidence on log sheets.

3.3.5.3 Certified/qualified personnel. A QA approved certified/qualified operator per AH-PEO-13 or S88-331/100 shall enter their identification number on the traveler when the requirements are accomplished.

3.3.5.4 Statistical process control. Maintain Statistical Process Control (SPC) charts that are traceable to each unit processed.

3.4 Detailed requirements

3.4.1 Offset printing

3.4.1.1 Process A: General. Markem's 7224 or 7251 ink shall be utilized. The marking shall be cured. See 5.4 for recommended cure schedule.

3.4.1.2 Process B: Polyester tape (Mylar). Pannier's 1001 black ink shall be applied.

3.4.2 Rubber stamping

3.4.2.1 Process C: General. An ink selected from Table I or from Table II or acid-etching ink, AB0290-003, shall be applied with a hand stamp. See 5.5 for recommended practices.

NOTE: Acid-etching ink, AB0290-003, shall be used on bare, metal surfaces only when specified by the drawing.

3.4.2.2 Process D: Identification plates. AB0290-002, Type I, Class 2, 3 or 4 or A-A-56032 ink shall be applied, dried or cured.

3.4.2.3 Process E: Silicone surfaces. Markem 6646-R ink (AB0290-002, Type II, Class 1) shall be applied. The ink shall then be fused into the surface by heating the part to 350 ± 10°F for a minimum of 30 minutes and a maximum of 1 hour.

3.4.2.4 Process F: Glass fiber tape, MIL-I-19166. Markem 8655 ink or equivalent shall be applied in accordance with 3.4.2.1.

3.4.2.5 Process G: Polyester tape (Mylar). Pannier's 1001 black ink shall be applied.

3.3.5 Validation methods. Unless otherwise specified in the detailed requirements, objective evidence of accomplishment of the requirements for this specification shall be provided by one of the following methods.

3.3.5.1 Build records. Record objective evidence on build records.

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3.4 Detailed requirements

3.4.1 Offset printing

3.4.1.1 Process A: General. Markem's 7224 or 7251 ink shall be utilized. The marking shall be cured. See 5.4 for recommended cure schedule.

3.4.1.2 Process B: Polyester tape (Mylar). Pannier's 1001 black ink shall be applied.

3.4.2 Rubber stamping

3.4.2.1 Process C: General. An ink selected from Table I or from Table II or acid-etching ink, AB0290-003, shall be applied with a hand stamp. See 5.5 for recommended practices.

NOTE: Acid-etching ink, AB0290-003, shall be used on bare, metal surfaces only when specified by the drawing.

3.4.2.2 Process D: Identification plates. AB0290-002, Type I, Class 2, 3 or 4 or A-A-56032 ink shall be applied, dried or cured.

3.4.2.3 Process E: Silicone surfaces. Markem 6646-R ink (AB0290-002, Type II, Class 1) shall be applied. The ink shall then be fused into the surface by heating the part to 350 $\pm$ 10°F for a minimum of 30 minutes and a maximum of 1 hour.

3.4.2.4 Process F: Glass fiber tape, MIL-I-19166. Markem 8655 ink or equivalent shall be applied in accordance with 3.4.2.1.

3.4.2.5 Process G: Polyester tape (Mylar). Pannier's 1001 black ink shall be applied.

3.4.3 Stenciling

3.4.3.1 Process H: General. TT-E-529 enamel or an ink selected from A-A-208, Table I or II, or acid-etching ink (AB0290-003) shall be applied while using a proximity mask (stencil). See 5.6 for recommended practices.

NOTE: Acid-etching ink (AB0290-003) shall be used on bare, metal surfaces only when specified by the drawing.

3.4.3.2 Process H-d: Identification plates. AB0290-002, Type I, Class 2, 3 or 4 or A-A-56032 ink shall be applied while using a proximity mask (stencil).

3.4.3.3 Process H-e: Silicone surfaces. Marking shall be applied with a stencil in accordance with 3.4.2.3.

3.4.3.4 Process H-f: Glass fiber tape, MIL-I-19166. Marking shall be applied with a stencil in accordance with 3.4.2.4.

3.4.3.5 Process H-g: Polyester tape (Mylar). Marking shall be applied with a stencil in accordance with 3.4.2.5.

3.4.4 Process J: Screen printing. When identified on drawings, items shall be marked by screen printing. See 5.7 for recommended practices.

3.4.5 Process K: Hand pen. AB0290-002, Type I, Class 2 or Rapidograph India ink shall be applied. The marking shall be dried at room temperature for 30 minutes minimum.

3.4.6 Transfers

3.4.6.1 Process L: General. Marking material from transfer sheets, AB0190-011, shall be applied. See 5.8 for recommended practices.

3.4.6.2 Process M: Identification plates and foils. Black carbon shall be transferred from a polyester (Mylar) ribbon.

3.4.7 Hot impression stamping, wire insulation and ties

3.4.7.1 Process N: General. Hot, impression-stamped characters for wire insulation and ties shall be applied. A TAB, Kingsley, Trojan or Eubanks marking machine in conjunction with a color-contrasting marking foil such as TB-0014, K-486, K-489, TB-0123, TBW016 or Eubanks marking foil 66620-26 shall be used. However, only Kingsley K-520 or K-30 foils shall be used when marking Teflon TFE on the Kingsley marking machine. The Eubanks marking foil 66620-26 shall be used on the Eubanks wire marker also on TFE. For wire and cable insulation, the marking type shall be selected from Table III and markings shall be placed in the direction of the wire axis. The Eubanks marking machine shall use vertical reading marker disc #60430-11. Recommended practices are presented in 5.9.

3.4.7.2 Process P: Polyimide/FEP (Kapton/Teflon). Hot, impression stamped characters shall be applied using a TAB, Kingsley, Trojan, or Eubanks marking machine in conjunction with a black marking foil such as TB-0014. For wire and cable insulation, the marking type shall be selected from Table III and markings shall be placed in the direction of the wire axis. Recommended practices are presented in 5.9.

3.4.7.3 Process Q: Heat-shrinkable sleeving. Hot, impression-stamped characters shall be applied using a TAB, Kingsley, Trojan, or Eubanks marking machine in conjunction with a color-contrasting Kingsley marking foil. See 5.9 for recommended practices.

3.4.8 Label printing

3.4.8.1 Computerized printing

3.4.8.1.1 Process RA: Computer printers. An EPC Microlabeler II Printer, an Epson Printer, a Brady Printer or an approved equivalent to these printers shall be used to apply characters which shall conform to the requirements in Table IV for Type I labels. These printers shall be equipped with one of the following ribbons:

a. EPC-RI indelible ink ribbon

b. R2070 Brady fabric ribbon or

c. Brady Series 2000 non-smear fabric ribbon or equivalent ribbon

See 5.10 for recommended practices.

3.4.8.1.2 Process RB: TMS System 90. The TMS System 90, a computerized system for creating, saving, changing, and printing Thermofit Marker System (TMS) products, shall be used with an IBM PC or compatible computer and an IBM Wheelwriter Typewriter. Printed markers shall be fed through a TMS permatizer to make a permanent bond of the mark. Recommended voltage setting shall be selected on the permatizer for the specific marker. See 5.10.2 for recommended practices.

3.4.8.2 Process RC: Thermal transfer printing. Thermal transfer printers shall be operated in accordance with manufacturer's instruction. See 5.10.3 for recommended practices.

3.4.8.3 Process S: Barcode printing. An Intermec 8404 High Density Barcode Printer and an Intermec R11400 Nonsmear Barcode Ribbon shall be used to apply barcodes which shall conform to the requirements in Table IV for Type III labels. The printers and ribbons in 3.4.8.1.1 may be substituted for the Intermec printer and ribbon. See 5.10 for recommended practices.

3.4.8.4 Process T: Xerographic printing. A Royal 3302MR Copier, a Ray Fax Copier-15 or an equivalent copier shall be used with the following materials to apply characters which shall conform to the requirements in Table IV for Type II labels:

a. 3302 MR Copier toner with Royal 3302 MR Copier

b. 115 Copier toner with Ray Fax Bond Copier-15 or

c. Toner made for that specific copier

See 5.10 for recommended practices.

3.4.8.5 Process TL: Laser printing

Manufacturer's recommended procedures shall be as followed.

3.4.9 Process U: Electrochemical etch. A Monode model 150, a Lectroetch Marking Unit, an Electromark Electrochemical Etcher, an Electro-chem Etch Co. model 100 or an approved equivalent machine shall be used to apply characters. See 5.11 for recommended practices.

3.4.10 Process V: Electric arc pencil. An electrical arc pencil shall be used to apply characters.

3.4.11 Process W: Engraving. Engraving machines shall be used to apply characters. See 5.12 for recommended practices.

3.4.11.1 Process WL: Laser engraving

Manufacturer's recommended procedures shall be followed.

3.4.12 Process X: Vibration tooling. Vibration marking tools shall be used to apply characters.

3.4.13 Cold impression stamping

3.4.13.1 Process YA: Cold impression stamping, unfilled. Impression stamps shall be used to apply characters.

3.4.13.2 Process YB: Cold impression stamping, filled. The impression stamping shall be filled with Lake Chemical's Lacquer-Stik or an approved equivalent.

3.4.13.3 Process Z: Computerized stamping. Schmidt 990SST programmable nameplate marker shall be operated in accordance with manufacturer's instruction.

3.4.14 Workmanship. Markings shall be legible, defined and free of voids, discontinuities, smears, bubbles or excess marking materials such as droplets or splatter. Protective coatings shall be free of brush marks, runs, sags, bubbles, voids and discontinuities.

3.4.14.1 Wire marking quality

3.4.14.1.1 Legibility. Markings shall be readable, complete and shall have definition with no evidence of wavy lines.

3.4.14.1.2 Durability. Markings shall be undamaged after testing.

3.4.14.1.3 Dielectric strength. The dielectric strength in marked areas of electrical insulation shall be no less than that in adjacent, unmarked areas or the rating of the insulation, whichever is lower.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for quality assurance. Unless otherwise specified, the Quality Assurance or Inspection organization of the supplier performing the process shall be responsible for verification of compliance with requirements specified. The supplier may utilize his own facilities or any commercial laboratory acceptable to the buyer to inspect or test for compliance.

4.2 Inspection and process monitoring. Inspection and process monitoring shall be performed in accordance with Table VI.

4.3 Quality evaluation methods

4.3.1 Surveys

4.3.1.1 Verification of equipment. The area(s) in which equipment is used shall be surveyed weekly for compliance with 3.1. Failure to meet the requirements will result in the cessation of processing in the area(s) surveyed until the discrepancy has been corrected. In the event equivalent equipment is used, the product results of the equivalent equipment shall be verified by the Boeing - Anaheim Materials and Processes engineer to be better than or equal to the required listed equipment.

4.3.1.2 Verification of material. The area(s) in which the material is used shall be surveyed weekly for compliance with 3.2. Failure to meet the requirements will result in cessation of processing in the area(s) surveyed until the discrepancy has been corrected. In the event equivalent material is used, the end results of the equivalent material shall be verified by the Boeing - Anaheim Materials and Processes engineer to be better than or equal to the required listed material.

4.3.1.3 Hazardous material. Safe handling, usage and storage of hazardous material shall be verified as specified in 3.3.1.1.

4.3.2 Test methods

4.3.2.1 Legibility. The marking shall be examined with normal 20/20 or corrected vision.

4.3.2.2 Durability

4.3.2.2.1 Inks, enamels, lacquers, pastes and coatings. The following methods shall be used to assess the durability of uncoated and cured markings:

a. For uncoated ink markings and coatings, an adhesive tape 3M #250 shall be pressed on the marking and pulled away rapidly. Adhesion failure of the marking or coating shall be cause for rejection.

b. For cured inks and coatings, stencils or silk-screened enamels, lacquers and pastes, an orangewood stick shall be used as a probe to ascertain whether markings and coatings have solidified. Solidified, cured inks and coatings shall be tested in accordance with 4.3.2.2.1 a. In addition, solvent resistance test shall be conducted by rubbing with a wet cotton swab containing acetone for 10 cycles (back and forth) with light pressure. Slight amount of ink removed is permissible.

4.3.2.2.2 Hot impression stampings. A sample of at least four marks shall be tested for adherence. The marked item shall be placed on a hard, flat surface and the marks rubbed with a flat surface of an eraser (3.2.17). The eraser shall be approximately 1/4 inch thick, and wide enough to cover the characters on the wire. The identification marks shall be subjected to 20 rubs with a firm pressure being applied manually along the entire length of the marking using the 1/4 -inch long eraser surface.

4.3.2.2.3 Sleeving and labels. Four (4) marked specimens shall be soaked in each of the following liquids at ambient temperature for 2 hours ± 10 minutes (except d):

a. MIL-H-5606 hydraulic fluid

b. TT-I-735 isopropyl alcohol

c. Deionized water

d. Axarel 36, 10 minutes at 165°F

After soaking, the marking shall be rubbed under firm pressure by one of the following methods:

a. Twenty rubs using a thumb or similar object that will not abrade or scratch the marking.

b. Ten rubs along the entire length of the marking with an eraser as specified in 4.3.2.2.2.

4.3.2.3 Dielectric properties of marked insulated wire

4.3.2.3.1 Dielectric test. Samples of each lot of the marked wire shall be tested for dielectric strength with a Hypot tester to determine that the marking has not adversely affected the dielectric properties of the insulation (3.4.14.1.3). The test voltage shall be in accordance with the applicable material specification. The wires being tested shall be immersed in water during testing, and dwell time, at rated voltage, shall be no less than 10 seconds.

F

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AA0104-001 "BE"

Part 2 of 2

4.3.2.3.1 (Continued)

The voltage shall be increased to the rated voltage value gradually at not more than 500 volts per second. As an alternate method, dielectric testing may be performed as a continuous in-line process utilizing high frequency sine wave spark test equipment. Spark test voltage settings shall not be greater than 200 percent of the minimum dielectric strength value required by the applicable wire specification MIL-W-22759.

4.3.2.3.2 Sampling. The sample size for dielectric testing shall be 10 feet of wire.

4.3.2.4 Visual examination. Visual examinations shall be conducted without magnification.

4.3.2.4.1 Visual examination by magnification. Examination with a 10X magnifier with a measuring reticle.

4.4 Verification methods. The following procedures shall be used to verify compliance with documentation requirements in accordance with 3.3.5.

4.4.1 Build records. Evidence of performance of process requirements documented on the build records shall be verified during normal planned visual inspection. Nonconformance shall be cause for rejection.

4.4.2 Log sheets. Evidence of performance of process requirements documented on log sheets shall be verified for all product processed. Nonconformance shall be cause for rejection.

4.4.3 Certified/qualified personnel. Verification of certified/qualified personnel performing required operations shall be accomplished by examining identification numbers logged on the traveler during normal visual inspection and assuring that the operator is certified to perform the operation in accordance with AH-PEO-13 or S88-331/100. Nonconformance shall be cause for rejection.

4.4.4 Statistical process control. Statistical process control charts shall be examined to assure that they are traceable to the unit processed for the applicable process requirements. Nonconformance shall be cause for rejection.

4.5 Silicone Labels. Bonding of marked labels to the parts shall be verified as specified in ST0106AA0040.

5. NOTES

5.1 Selection of marking method

5.1.1 General application. Inks from Tables I and II applied by rubber stamping, stenciling or hand pen provide markings which are acceptable for most applications, temporary or permanent. Markem's 7224 and 7251 ink applied by offset printing produces markings which are notably resistant to common solvents and aqueous cleaning solutions. Polyimide (Kapton) labels are solvent resistant and temperature resistant; they resist vapor degreasing, vapor phase soldering, wave soldering, and infrared reflow soldering. Polyimide (Kapton) labels are resistant to ultraviolet light and adhere well to connectors. Identification plates used on interior surfaces are sometimes a useful alternative to ink marking these surfaces.

NOTE: Ink, enamel, varnish and paint should not be used on surfaces which may contact oxidizers such as hydrogen peroxide or liquid oxygen.

5.1.2 Special application

5.1.2.1 Temporary marking. A temporary marking should be used during manufacture and in-receiving/in-plant inspection when needed. Temporary marking of trim areas by any method are allowed. However, temporary marking of purchased items without a trim area should only use a method in this specification. This marking should not:

a. Have any harmful effects on the item.

b. Be located where it cannot be removed or hidden in later assembly.

c. Be subject to obliteration or damage during the period of intended use.

d. Conflict with any permanent markings.

e. Appear on the completed item.

f. Require a protective coating.

5.1.2.2 Restoration of marking. When marking information has been revised or damaged or lost prior to assembly processes, the marking information (e.g., part number) should be restored. In restoration of marking, the original method of marking is preferred, but rubber stamping, hand pen lettering or application of polyimide pressure sensitive labels are also acceptable. However, marking information damaged or lost during assembly processes shall not be restored.

5.1.2.3 Tag removal. Removal of tags during processing operations is allowable. However, the tags should be restored once the operation is complete.

5.1.2.4 Heat shrinkable sleeving. A marked, heat-shrinkable polyolefin or polyvinylidene-fluoride sleeve is a practical way to mark wire insulated with polyimide (Kapton) and multiconductor and coaxial cables which are damaged by hot impression stamping. The sleeving should be selected so as to produce a 5 to 10 percent circumferential interference fit after shrinking.

5.1.2.5 Touch-up. Unwanted marking material such as droplets should be removed. Unacceptable markings should be removed using a suitable solvent. The surface should then be cleaned and the marking reapplied. Protective films removed by marking procedures can be touched up. When electrochemical etching is used to mark aluminum or magnesium alloys, and chemical films are removed, these films should be restored. After touch-up, the marking should be clearly legible and visible. Voids or discontinuities should be touched up with the same material.

5.1.3 Usage limitations

5.1.3.1 Acid etch ink. Acid etch ink, AB0290-003, is not solvent resistant. This ink is useful for general purpose marking of metals and non-metals but should not be used on high-strength aluminum alloys, alloy steels, magnesium alloys, plated Kovar, or beryllium.

5.1.3.2 Cold impression stamping. Cold impression stamping is a method of marking metals which should be applied only after careful analysis of the case at hand. It may be used for temporary marking only if the marked surface will be either machined subsequently to a minimum depth of 0.100 inch below the impression or trimmed off completely. Cold impression stamping should not be employed if any of the following conditions exist:

a. When stamps crush or distort items.

b. After applying surface coatings such as paint or conversion coatings or after anodizing. However, impression stamping over cadmium or zinc plate is acceptable. If it is necessary to impression stamp an anodized aluminum item, the marking should be chemically treated in accordance with AA0109-016. Hard anodized coatings should not be impression stamped.

c. On plumbing, tubing, metal tank skins, pressure vessels, push-pull control tubes and springs that will be under pressure.

d. On small parts that have been heat treated to a hardness higher than Rockwell C43. (Electrochemical etch marking may be used after heat treatment.)

e. Surface having a finish of 63 rms or less, bearing or mating surfaces subject to rubbing, sealing surfaces, or any area where the function of that surface would be impaired by impression stamping.

f. Areas near holes, fillets, radii or edges, or on areas to be cut or drilled.

g. Sensitive materials such as:

1. Aluminum castings alloys 122 and 142.

2. Magnesium alloy sheets, plates, strips, bars, extrusions, and tubing or castings and forgings without marking pads or designated marking areas.

3. Titanium and titanium alloys.

4. Corrosion and heat resistant alloys such as Rene' 41, Inconel, Inconel 718, Inconel X, PH15-7 Mo, 17-7 PH, 17-4 PH, 350, 355, and AISI 440C.

5.1.3.2 (Continued)

5. Carbon and low alloy steels, such as 4340 and H-11, which are or will be heat treated to 1379 MPa (200,000 psi) and above.

6. Beryllium.

h. Non-metallics. Consult with The Boeing Company, Anaheim Materials and Processes engineer.

5.1.3.3 Electric arc marking. This marking can be used on metal parts with the same requirements and limitations as impression stamping (5.1.3.2). Additional limitations are recommended as follows:

a. Never use on thin metal which is susceptible to distortion or damage from heat.

b. Never use on bearing surfaces or after chemical surface treatments.

5.1.3.4 Vibration tooling. Vibration tooling can be useful in cases where cold impression stamping causes cracks or distortions. It is particularly useful on machined parts, castings, forgings and extruded or formed parts. Vibration tooling should not be employed if any of the following conditions exist:

a. When metal plates or sheets are less than 0.062 inch thick.

b. When any bearing or mating surface is subject to rubbing.

c. On sealing surfaces or areas where marking would impair the function of the part.

d. On painted, chemical filmed or anodized surfaces. However, such marking over cadmium or zinc plate is acceptable. If it is necessary to mark an anodized surface with a vibrating tool, the marking should be chemically treated in accordance with AA0109-016.

e. On plumbing, tubing, metal tank skins, pressure vessels, push-pull control tubes and springs without raised marking pads or designated marking areas.

5.1.3.4 (Continued)

f. Sensitive metals such as:

1. Titanium and titanium alloys.

2. Magnesium alloy sheet, plate, strip, bar, extrusions and tubing or castings and forgings without marking pads or designated marking areas.

3. Carbon and low alloy steels such as 4340 and H-11, which are, or will be, heat treated to 1379 MPa (200,000 psi) or above.

5.2 Surface preparation

5.2.1 General usage. Prior to marking parts surfaces may be prepared by the following methods:

5.2.1.1 Abrading prior to cleaning. Plastic surfaces which have been molded or laminated should be abraded with 400 to 600 grit abrasive sheet prior to cleaning and marking procedures. Before marking porous surfaces, e.g., circuit board edges, the area to be marked should be lightly abraded using No. 400 grit abrasive sheet. The abraded area should be cleaned and a coat of AB0120-11, Type II should be applied and cured (see 5.3.2).

5.2.1.2 Cleaning. Reagent grade isopropyl alcohol (TT-I-735, Grade A) should be the only cleaning solvent used on beryllium surfaces. Chlorinated solvent should not be used on titanium surfaces.

5.2.1.2.1 Immersion cleaning. Parts or assemblies suitable for immersion in solvent can be treated as follows:

a. Suspend the parts in a cleaning solvent for 30 to 60 seconds at 70 ± 10°F. This cleaning solvent should be a mixture of 50 ± 10 parts by volume of naphtha in 50 ± 10 parts by volume of isopropyl alcohol. Agitate the parts or otherwise provide a rapid flow of the cleaning solvent over the surface of the parts. The cleaning solvent should be changed frequently to avoid accumulation of contaminants which would be deposited on the parts. Acetone may be used on metal surfaces.

b. Directly after cleaning and before the parts have dried, they should be spray rinsed with clean isopropyl alcohol. Sufficient cleaning solvent should be used so that it flows off all surfaces of the part with a flushing action. Acetone may be used on metal surfaces.

5.2.1.2.2 Hand cleaning. Parts or assemblies unsuitable for immersion in solvent should be cleaned by swabbing with isopropyl alcohol/ naphtha (50/50 by volume) followed by virgin isopropyl alcohol rinse. Wipe or blot with clean cloths or tissues before cleaning solvent evaporates. Acetone may be used on metal surfaces.

5.2.1.2.3 Vapor degreasing. Parts may be vapor degreased in accordance with AA0110-027 or AA0110-028 (ODS).

5.2.2 Special cases

5.2.2.1 Cables. Before applying markings, sleeving or marked tape to cables, cables should be cleaned by wiping with a clean cloth saturated with isopropyl alcohol.

5.2.2.2 Abraded areas. Debris may be removed by wiping with a clean cloth saturated with isopropyl alcohol. . Acetone may be used on metal surfaces.

5.2.2.3 Pressure-sensitive plates and labels. Surfaces upon which pressure-sensitive plates or labels are to be placed may be cleaned by wiping and then rinsing with isopropyl alcohol. Uncontaminated solvent should be used for the final rinse. Acetone may be used on metal surfaces.

5.3 Protective coatings. These coatings are meant to be applied over dried/cured markings. They should not be applied to areas where they may interfere with equipment operation or performance.

5.3.1 Intermediate coating. A clear coating, Humiseal 1B12, may be used as an intermediate coating when solvent and temperature resistance is not required. A single coating should be used. The coating should be dried for at least 2 hours at 60 to 85°F prior to being overcoated.

5.3.2 Outer coating. Coatings should be applied by lightly brushing to produce a thickness of 0.001 to 0.002 inch. Care should be taken to avoid abrading the characters, figures and ikons. If the initial coating fails to cover adequately, it should be cured and then touched up with additional coating. It is recommended that AB0120-011, Type II be used on transfer markings. AB0120-011, Type II should be cured in accordance with either of the following schedules:

a. 140 ± 10°F for a minimum of 2 hours,

or

b. 77 ± 10°F for a minimum of 16 hours; do not use this cure if solvent resistance is required.

5.3.2 (Continued)

AB0125-041 should be cured in accordance with one of the following schedules:

a. 160 ± 10°F for 45 minutes, minimum,
or
b. 140 ± 10°F for 1 hour, minimum,
or
c. 120 ± 10°F for 2 hours, minimum,
or
d. 77 ± 10°F for 16 hours, minimum; do not use this cure if solvent resistance is required.

Cures may be run concurrently with other cures, such as those for fillets.

If AB0125-041 material causes markings to run, AB0120-011, Type II, Class 2 should be used. Where heat or solvent resistance is not required, an undercoating of Humiseal 1B12 may be used. The Humiseal should be dry before overcoating with AB0125-041 or AB0120-011, Type II, Class 2 material.

5.4 Offset printing. Markem's 7224 and 7251 phenolic-based semipaste ink should be cured in accordance with one of the following schedules:

a. 350 ± 10°F for 1 minute, minimum,
or
b. 300 ± 10°F for 5 minutes, minimum,
or
c. 250 ± 10°F for 30 minutes, minimum.

5.5 Rubber stamping

5.5.1 Selection of ink. Tables I and II present characteristics and criteria for selection of ink.

5.5.2 Type I and Type III marking inks

5.5.2.1 Pads and stamps. Inks should not be used interchangeably on ink pads. The following recommended practices are applicable to all Type I and Type III inks listed in Table I:

a. Thoroughly mix the ink in a uniform thin coating on a flat, non-absorbent surface before applying to the stamp pad or braying. Apply the ink to the stamp pad by uniformly working the ink from the center toward the edges of the pad using a stiff brush or a rigid wood applicator. The ink should be worked into the pad. It is recommended that double foam rubber pads and a plastic case be used.

5.5.2.1 (Continued)

b. Ink the stamp uniformly by pressing the printing surface against the inked surface of the pad or plate. A slight rocking movement of the rubber stamp will ensure sufficient ink pickup on all surfaces of the characters. Avoid excessive ink as this will result in smeared and illegible markings. Try on a test surface.

c. Immediately place the inked stamp against the surface to be marked and exert slight uniform pressure for 2 to 3 seconds. Ease the pressure and without any slippage remove stamp from the surface with a straight-up, pull-off motion. Avoid exerting excessive pressure when marking as this will compress the rubber characters or figures and result in illegible markings.

d. If the marking is not legible with sharp and well-defined characters, remove the marking with a clean cloth dampened with the specific thinner for the ink used, and re-mark. If no ink thinner is specified for a specific ink, isopropyl alcohol may be used to remove the ink markings.

NOTE: Ink will affect some paints, plastics, organic coatings or treatments. Therefore, prior to removing ink markings from such surfaces, it is recommended that the Materials and Processes engineer be consulted.

e. Stamp pads should be kept covered when not in use to prevent drying and contamination.

f. Stamp pads may be re-conditioned and softened by dampening the surface of the pad with the thinner specified for the ink which has been used. When the pad is soft and pliable, re-ink the pad and work the ink into pad.

g. Do not allow rubber stamps to be left contaminated with accumulated ink. Stamps should be cleaned by immersion in the corresponding ink thinner and scrubbed with a stiff brush. Denatured alcohol may be used for cleaning stamps. Do not interchange ink thinners or use other solvents, as they may destroy the stamp.

5.5.2.2 Application of Type I and Type III marking inks

a. Surfaces should be cleaned using an isopropyl alcohol/naphtha solution (50 ± 10 ppv IPA in naphtha)(50 ± 10 ppv IPA in naphtha) followed by an isopropyl alcohol rinse. Acetone may be used on metal surfaces.

b. Dry the area thoroughly with a clean cloth or tissue.

5.5.2.2 (Continued)

c. Black color should be used on bare metals and light colored backgrounds. Contrasting colors (e.g., white or yellow) should be used on dark colored backgrounds.

d. Apply the ink stamp to the part. Recommended methods are the same as in 5.5.2.1, c and d above.

e. Allow the ink markings to air dry completely (30 minutes at room temperature) and apply a light coat of the applicable protective coating. Drying of Type I, Class 1 inks may be accelerated in an oven or by infrared lamps until dry to the touch. The temperature of the oven should not exceed restrictions for the part or assembly. Infrared lamps should be maintained at a distance such that the heat produced does not harm the part or assembly. Type III ink dries in about 15 minutes at 60 to 85°F.

5.5.3 Type II marking inks. All two-component inks of Type II marking inks (Class 3 and Class 4) should be thoroughly mixed before use.

5.5.3.1 Mixing. All catalysts should be added in as exact proportions as possible. The mixing ratios (resin/catalyst) should be as follows. All mixing ratios are by weight except NAZDAR ER series inks and catalyst ER176 which should be measured by volume.

Supplier	Ink Resin	Catalyst	Mixing Ratio By Weight)
1. Type II, Class 3			
Hysol 50 series	50-100 white	#20 or #28	100/6.0
	50-201 yellow	#20 or #28	100/6.0
	50-206 orange	#20 or #28	100/6.0
	50-301 green	#20 or #28	100/7.0
	50-407 blue	#20 or #28	100/7.5
	50-771 black	#20 or #28	100/6.0
	50-800 clear	#20 or #28	100/9.0
Hysol M series	M-9-N white	A	100/4.9
	M-0-NC black	A	100/4.9
	M-2-N red	A	100/4.0

5.5.3.1 (Continued)

Supplier	Ink Resin	Catalyst	Mixing Ratio By Weight)
NAZDAR	ER series (color as specified)	ER176	4 parts/1 part
Hysol 50 series	50-100 white	#9	100/6.0
	50-201 yellow	#9	100/6.0
	50-206 orange	#9	100/6.0
	50-301 green	#9	100/7.0
	50-407 blue	#9	100/7.5
	50-771 black	#9	100/6.0
Hysol M series	M-9-N white	#B-3	100/5.0
	M-0-NC black	#B-3	100/4.0
	M-2-N red	#B-3	100/4.0

5.5.3.2 Induction period. The mixture of resin and catalyst should be mixed well and allowed to stand for a period of 30 to 45 minutes. This period, called "induction period", is necessary to allow the catalyst to become uniformly mixed and available for the curing process.

5.5.3.3 Thinning. Thinning, if required, should be made after induction period. The following thinners should be used.

Ink Resin	Thinner
Hysol 50 series	AD2001 or butyl cellosolve acetate
Hysol M series	AD2003(T-1)
NAZDAR ER series	RE180

5.5.3.4 Pot life. Pot life of mixed ink depends upon the catalyst used. The average pot life of various inks should be as shown below. The addition of thinner may extend the pot life.

Ink Resin	Catalyst	Average Pot Life (Hours)
50 series	#20	6
	#28	2.5
	#9	7
M series	#B-3	4

5.5.3.5 Application of Type II marking inks

a. Type II marking inks are thick, heavily pigmented, slow drying and should not be used on stamp pads.

b. The surface to be marked should be cleaned (5.5.2.2, a and b).

5.5.3.5 (Continued)

c. Colors should be selected from the listing in FED-STD-595.

d. Apply well mixed ink to a clean, flat, glass plate. Roll or spread the ink to a thin smooth layer.

e. Recommended methods of inking the stamp and applying the marking are given in 5.5.2.1.

f. Type II, Class 1 inks will normally dry tack-free for handling or coating after one hour at 70 ± 10°F. Complete drying requires a minimum of eight hours at 70°F minimum.

g. Type II, Class 2 inks can be force-dried in accordance with one of the following schedules:

CURE TEMPERATURE (± 15°F)	DRYING TIME, MINUTES, MINIMUM
300	10
200	30
150	90
125	Until dry to touch

h. Accelerated drying of Type II, Class 1 or 2 inks may be accomplished by heating in an oven or under infrared lamps, provided it is not harmful to the part. Do not expose electronic parts such as transistors and diodes to infrared.

i. Type II, Class 3 inks (room temperature curing) are cured for one hour at 70 ± 10°F before they are tack-free and the parts can be handled. These inks require at least seven days curing time at 70 ± 10°F to obtain a complete cure. The cure time can be accelerated in accordance with one of the following schedules:

CURE TEMPERATURE (± 15°F)	CURE TIME, MINUTES, MINIMUM
350	5
300	10
250	30
180	45
150	120
140	240

j. Type II, Class 4 inks (heat curing): Cure these inks using the elevated temperature cure schedules specified above in (i).

5.5.3.5 (Continued)

k. Type II, Class 5 and 6 inks (heat curing): Cure these inks in accordance with one of the following schedules:

5 minutes minimum at 350-375°F, or
15 minutes minimum at 300-325°F, or
2 hours minimum at 250-275°F, or
4 hours minimum at 250-275°F for low outgassing requirement

5.5.4 Applying acid etch marking ink

a. Allow the ink markings conforming to AB0290-003 to air dry completely (1-1/2 hours minimum). The markings may be force dried as follows:

CURE TEMPERATURE (± 15°F)	DRYING TIME, MINUTES, MINIMUM
180	10
150	30
125	45

b. Infrared lamps may be used in accordance with 5.5.3.5, h. Do not use an excessively thick coating, lapping or brushing. These cause this acid ink to bleed or run.

5.6 Stenciling. The drying/curing schedules for the inks listed in Tables I and II are shown in 5.5.2 and 5.5.3: for AB0290-003 acid etch ink in 5.5.4. TT-E-529 enamel should be dried in room temperature air for 48 hours.

5.7 Silk screening

5.7.1 Frames and screens

5.7.1.1 Preparation of frame and screen

a. Fabricate the frame from wood or other suitable material on which the screening can be stretched and fastened.

b. Construct the frame so that the tension created by stretching the screening will not warp the frame. The corners should be square and reinforced as necessary. Provide for further application of tension to the fastened screen material.

c. Make the dimensions of the frame larger than the image to allow space for a reservoir of the marking material. This space should be a minimum of three inches above and below the image and three inches on each side.

5.7.1.1 (Continued)

d. Cut the screen material at least one inch larger than the length and width of the frame.

e. Fasten the material to one side and one end such that the threads of the material are parallel to the sides of the frame. Apply sufficient tension to draw the material taut. Fasten the material to the remaining end and side and trim the excess material.

f. Prior to use, draw the screen material taut by using the tension devices on the frame.

5.7.1.2 Preparation of image on transfer film.

a. Cut the transfer film at least 3/8 inch longer and wider than the photographic transparency.

b. Place the transfer film in a suitable vacuum printer with the Mylar side up. Position the transparency over the Mylar film with the image appearing reversed. In this position, the transparency emulsion should be against the Mylar film.

c. Lower the glass lid of the vacuum printer, fasten securely and apply a vacuum of 12 ± 4 inches of mercury.

d. Expose the transfer film to an ultraviolet light source in such a manner as to obtain a rating of 8 ± 2 on the Kodak No. 2 Step Tablet.

e. Remove the transparency from the Mylar film and then remove the transfer film from the printer.

f. Prepare the developer by combining 30 to 60 ml of 30 percent hydrogen peroxide with enough deionized water to make 2000 ± 5 ml of solution. Prepare the Ulano developer by combining 26 ± 0.5 grams of Part A with 35 ± 0.5 grams of Part B in 16 ± 1/2 oz of deionized water at 75°F maximum. Mix thoroughly and maintain between 64 and 75°F.

g. Immerse the exposed transfer film in the developer and agitate the film or solution lightly until the image is developed. Carefully rinse with tap water to remove the developer.

h. Proceed to the next process step (5.7.1.3) as soon as possible to prevent possible warpage due to drying of the gelatin. Change the developer at least daily and mix within three hours of use.

5.7.1.3 Affixing the image to the screen

a. Wet the screen portion of the screen stencil with tap water. Invert the screen stencil so that the screen is uppermost. Place the image (gelatin-coated) side of the Mylar film on the screen, properly positioned. Invert the screen stencil and place it on a raised flat surface so that the Mylar film is against the flat surface. The flat raised surface should be of such a size that the frame does not touch it at any point. Normally the weight of the screen stencil will force the gelatin into the screen mesh; however, slight additional pressure may be used when necessary.

b. Carefully remove excess water by blotting with sponge or other suitable materials.

c. Screen quality. The screen stencil pattern shall be a duplicate of the photo transparency image within specified tolerances. The exposed areas of the screen through which the marking material will flow should be clean and contain no extraneous gelatin, dirt or other foreign matter. The areas of the screen requiring gelatin coverage should be free of voids, pits or any discontinuation that allow the marking material to pass through the screen.

5.7.1.4 Drying

a. Imaged transfer. The film should be air dried at a temperature not to exceed 80°F for a minimum of 20 minutes.

b. When the gelatin has thoroughly dried, carefully remove the Mylar film.

5.7.1.5 Touch-up. Any voids or excessively thin areas in the gelatin should be sealed by brushing the area with the gelatin touch-up solution and drying at ambient temperature for a minimum of ten minutes or until the treated area has hardened. The touch-up solution should be thinned to the desired consistency using deionized water.

5.7.2 Application of the marking material

a. Position the screen stencil over the part to be worked. Adjust the height of the screen stencil so that there is a minimum of 1/16 inch between the screen and the surface to be marked. Use alignment devices such as locating pins and holes when necessary.

b. Maintain the screen stencil frame and part to be marked in such a manner as to exclude any possibility of relative movement during the stenciling operation.

5.7.2 (Continued)

c. Mask the screen using masking tape and clear cellophane tape as required for parts to be stenciled.

d. Construct a reservoir for the marking material at one end of the pattern using masking tape to avoid seepage of the material.

e. Fill the reservoir with the necessary amount of the specified marking material.

f. Carefully wet the squeegee with the marking material and place it on the screen at the end opposite the reservoir. Avoid dripping the marking material on the screen or part. Incline the squeegee towards the reservoir at an angle approximately 30 degrees from the surface of the screen. Press the squeegee firmly against the screen and push the squeegee firmly and smoothly across the screen towards the reservoir to effect one pass across the entire pattern.

5.7.3 Drying/curing of markings

5.7.3.1 NAZDAR paste ink 59-111 black and 59-112 white. It can be oven dried in 30 minutes at 180°F.

5.8 Transfers. Transfer markings should be applied as follows:

a. The transfer sheet should be placed "face down" with the character(s) directly over the appropriate area.

b. The sheet should be held in place to prevent slippage and should be burnished firmly with a tool that does not tear, cut or abrade the transfer sheet.

c. While the sheet's register is held, the sheet should be lifted to inspect the transfer of each character. Reburnishing should be done without changing the register if the transfer is incomplete.

5.9 Machine marking of wire and cable. These methods may be used for applying identification to Kynar (polyvinylidene fluoride), to polyimide coated wire (formerly ST0104AA0025), to Teflon coated wire and braids (formerly AA0104-002 and AA0104-015), to sleeving (formerly AA0104-023), to nylon jacketed wire (formerly AA0104-010) and to Teflon cables (formerly LA0104-015). Glass cloth tape is used for marking Teflon cables (formerly LA0104-015).

5.9.1 Machine set-up. The following steps are recommended in order to prepare a machine for operation:

a. Adjust the marking machine to the shortest dwell time and lowest pressure which produces legible and abrasion-resistant markings for the particular size of wire to be marked. If initial adjustments do not result in legible and abrasion-resistant markings, dwell time and/or pressure should be increased in small increments until satisfactory markings are obtained. Polyimide (Kapton) wire is notch sensitive, so pressure should be 30, not to exceed 35, psi when marking.

b. Place the appropriate characters of type, (see Table III), in the type holder of the marking machine.

c. Energize the marking machine and set the machine heater to operate at the temperature indicated in Table V. When the marking machine has reached the required temperature, insert the type holder and allow a minimum of 2 minutes for the type to attain the correct temperature before marking the wire.

NOTE: The type and type holder should be preheated in the marking machine prior to use. Preheated type and holders do not require heat-up time in the marking machine. The lowest temperature which gives a legible and abrasion-resistant marking should be used.

d. Mark a trial length of wire or cable and verify that the markings meet legibility, durability and dielectric strength requirements per 3.4.14.1. If not, readjust the machine and evaluate another trial length.

5.9.2 Operation. Set the marking machine for automatic operation. Thread the wire or cable that is to be marked through the holding fixture and make a single impression to be sure that the marking is correct. Advance the wire or cable through the guide tube. Make sure that the wire or cable engages the pulling and tension wheels.

5.10 Label printing

5.10.1 Polyimide label. Solvent resistance of markings printed on polyimide (Kapton) labels may be improved by baking at 225 ± 10°F for one hour minimum while still on their release liner.

5.10.2 TMS system. In TMS System 90, the recommended voltage settings on TMS permatizer should be used as a guide only. Supply voltage fluctuations and individual lamp performance may require slightly different settings. A simple check can be made for TMS product permanency. Run a strip of marked TMS through the permatizer. Allow the product to cool to room temperature. Rub the mark 20 times, in one direction, with a tissue soaked in methyl ethyl ketone (MEK). If the mark is not visible from a distance of 14 inches, adjust the voltage up in 5 volt increments. If the marks are too dark or burned, adjust the voltage down in 5 volt increments.

5.10.3 Thermal transfer printing. Print quality of thermal transfer printer depends upon media, ribbon, print speed, printhead temperature and pressure. Some operator adjustments may be required in order to optimize the print quality. For instance, variation in media thickness and the type of ribbon being used make it necessary to alter the printhead pressure. To ensure that the thermal printer has proper cooling, do not place any padding or cushioning material on the back of, or underneath, the unit.

5.11 Electrochemical etching method. The following steps are for the Electro-Chem Etch Co.'s "Producer" Power Unit. Other units have similar procedures.

a. Clean area by wiping with a clean cloth saturated with acetone naphtha/isopropyl alcohol (50/50 by volume). Wipe off solvent with clean cloth or tissues before the solvent evaporates.

b. Set AC-DC switch to correct position for the material being marked (DC for aluminum and magnesium and AC for other metals).

c. Set power unit selector on "D" for normal markings. A sample part should be used to determine the settings which will produce optimum markings. If the mark is blurred, too much amperage is being used and the rheostat should be set back to "C," "B," or "A" as necessary. If the mark is too light on the marked part, set the Power Unit selector switch to "E."

d. Saturate the applicator pad with the applicable electrolyte. Attach a stencil containing the required information to the applicator such that the stencil reads backwards facing the operator.

e. Saturate the cleaner tray pad with the same electrolyte being used in marking.

5.11 (Continued)

f. Connect the required electrical wiring to the items and marking equipment.

g. Mark by contacting the applicator with stencil to the part for approximately 5 seconds. Longer periods do not deepen the marking as long as the current is not interrupted.

h. Do not turn the power switch on and off while the applicator is in contact with the item.

i. To prevent corrosion, swab immediately following marking with a cloth saturated with the appropriate cleaner or neutralizer. Small precision items should be immersed and scrubbed in the cleaner or neutralizer.

j. After the cleaning or neutralizing treatment, the items should be thoroughly dried. A light coat of oil conforming to MIL-C-15074 may be applied to items, if it does not conflict with subsequent operations or the function of the item.

5.11.1 Process substitutions. Electrochemical etching instead of electric arc pencil can be used when parts do not require plating or finishing. The following may be substituted for ink stamping under the conditions indicated:

a. Stenciled markings may be substituted for rubber stamp marking where or when the surface may be satisfactorily marked by stenciling.

b. Decalcomanias, adhesive-backed labels or identification plates may be substituted when used on interior surfaces.

NOTE: All substitutions should be approved by the responsible Boeing - Anaheim Materials and Processes engineer prior to their use.

5.12 Engraving method. The manufacturer's instructions should be followed. Metal surfaces should be engraved prior to application of finishing coatings (anodize, chemical film, etc.).

5.12.1 Selection of cutter. From the letter size and type of groove specified, the operator should select the appropriate cutter and determine the necessary pantograph reduction ratio and size of the master copy types.

5.12.2 Machine set-up. The types should be placed in a copy holder, which in turn should be firmly aligned on the copy table. The cutter should be inserted into the spindle.

5.12.3 Material placement. Materials to be engraved should be securely and properly held in place immediately below the cutter, or be so located in relation to the master copy types that the desired markings can be accurately engraved.

5.12.4 Insertion of stylus. With the cutter drive motor off, the cutter should be raised until the cutting tip is out of contact with the work surface when the tracing stylus is inserted in any of the master types.

5.12.5 Engraving operation. With the drive motor operating and the tracing stylus inserted in any of the master types, the cutter should be lowered until the desired engraving width within the allowable depth is reached. Proceed with engraving by carefully tracing all the master types.

5.12.6 Tool corrections. Engraver cutters should be sharpened whenever necessary with a cutter grinder to ensure quality work.

5.12.7 Color filling. When color filling is required, the engraved markings should be coated with TT-E-527 enamel or other suitable paint of a contrasting color. The areas to be coated should be thoroughly cleaned to ensure coating adhesion. The enamel should be dried in room temperature air for 48 hours and protected with AB0125-041.

5.12.8 Laser engraving/marking

Laser is harmful to people, proper procedures should be taken, especially for eye protection.

5.13 Computerized stamping. The 9905ST programmable nameplate marker uses a considerable amount of force to stamp a character onto a nameplate. Because of the extreme force, keep hands and fingers away from the character dial and anvil during stamping. A moderate pressure is used to open and close the clamp by a solenoid. Use caution when inserting and removing a nameplate from the fixture and keep hand and fingers away from the clamp. All components inside the housing operate at high voltage levels and caution must be taken when performing maintenance on the machine.

5.14 Fielded cables. A piece of marked tape should be cut which is equal to the circumference of the cable to be identified plus overlap. The overlap should be greater than 0.062 inch but less than 1/4 the circumference of the cable. The marked tape should be wrapped around the cable and pressed firmly by hand.

5.15 Definitions

5.15.1 Marking. A marking is a figure, character or symbol, or group thereof, which is impulsed on a surface.

5.15.2 Surface. A surface is either that of hardware or that of an identification device.

5.15.3 Identification device. An identification device is a medium upon which a marking is impulsed and which is intended to be affixed to hardware.

5.15.4 Marking method. A marking method is the mechanical or chemical means by which a marking is impulsed on a surface.

5.15.5 Marking process. A marking process is the implementation of a marking method for a particular surface.

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TABLE I. SELECTION OF NON-ETCHING INK
(FAST DRY)

AB0290-002		SOLVENT RESISTANCE WITHOUT A PROTECTIVE COATING	GENERAL USE
TYPE	CLASS		
I	1	Nonsolvent resistant	General purpose marking where there is no solvent resistance requirement.
I	2	Resistant to ultrasonic cleaning in detergents (Petroklene) and washing with Calgonite and warm water	In applications where the markings must resist various aqueous cleaning processes.
I	3	Resistant to ultrasonic cleaning in 1,1,1,-trichloroethane or Freons	In applications where the markings must resist ultrasonic cleaning in Freons or 1,1,1-trichloroethane such as plastic electronic connectors.
I	4	Resistant to ultrasonic cleaning in mild detergent and warm water	In applications where environmental conditions of 100 percent 0_2 exist, possible elevated temperatures and/or intermittent vacuum may be present.
III	-	Water soluble, pigmented ink	For marking on metal, plastic, or painted surfaces. Good legibility where hand lettering is used.

NOTES: (a) All Type I inks are removable by isopropyl alcohol; the degree of removal depends on the type of surface.

(b) Type I inks with the clear protective coating, AB0125-041 or AB0120-011 Type 2, are resistant to alcohol-naphtha solution and other solvents. AB0120-011 Type 2 is preferred.

(c) Drying time for Type I inks is from 3-30 minutes.

(d) In general, Type I inks may be used on ink stamp pads except for the very fast drying inks.

TABLE II. SELECTION OF NON-ETCHING INK
(SLOW DRY)

AB0290-002		SOLVENT RESISTANCE OF INK WITHOUT A PROTECTIVE COATING	GENERAL USE
TYPE	CLASS		
II	1	Nonsolvent resistant	Identification marking on metal, plastic, or painted surfaces.
II	2	Solvent resistant	Identification marking on metal, plastic, or painted surfaces.
II	3	Two-component, room temperature curing. When completely cured, these inks are abrasion, temperature, fungus and solvent resistant.	Identification marking on metal, plastic or painted surface where solvent, temperature and abrasion resistance is required.
II	4	Two-component, heat curing. When completely cured, inks have same properties as Class 3, above.	Same as Class 3, above.
II	5 & 6	One-component, heat curing. When completely cured, same properties as Class 3.	Same as Class 3, above.
A-A-56032		Two-component, room temperature or heat curing. When completely cured, same properties as AB0290-002, Type II, Class 3.	Same as AB0290-002, Type II, Class 3, above.

NOTES: (a) Type II, Classes 3, 4, 5 and 6 may also be used for silk screening, provided the consistency of material is adequate for application.

(b) The pot life of the catalyzed inks (Classes 3 and 4) is approximately six hours.

(c) The pot life of the catalyzed MIL-I-43553 is at least 3 hours in a closed container and less than one hour in an open container.

(d) Type II, Class 4 or 6 will work for offset marking.

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TABLE VI
CORRELATION OF ENGINEERING REQUIREMENTS AND QA PROVISIONS

REQUIREMENTS	REQUIREMENT PARAGRAPH	EVALUATION PARAGRAPH	EVALUATION METHOD	QUANTITY & FREQUENCY
Equipment	3.1 - 3.1.14	4.3.1.1	Survey	Weekly
Material	3.2 - 3.2.17	4.3.1.2	Survey	Weekly
Safety and environmental	3.3.1	4.3.1.3	VS	100% and per AA0117-004
Marking of parts fabricated in house	3.3.2.1	4.3.2.4	Visual	100%
Marking of parts fabricated outside	3.3.2.2	4.3.2.4	Visual	100%
Location	3.3.2.3	4.3.2.4	Visual	100%
Identification (I.D.) plates	3.3.2.4	4.3.2.4	Visual	100%
Identification of assemblies	3.3.2.5	4.3.2.4	Visual	100%
Restoration of markings	3.3.2.6	4.3.2.4	Visual	100%
Magnesium alloys	3.3.2.7.1	4.3.2.4	Visual	100%
Beryllium	3.3.2.7.2	4.3.2.4	Visual	100%
Tag	3.3.3.1	4.3.2.4	Visual	100%
Tag removal	3.3.3.1.1	4.3.2.4	Visual	100%
Small items	3.3.3.1.2	4.3.2.4	Visual	100%
Identification ties	3.3.3.2	4.3.2.4	Visual	100%
Silicone labels	3.3.3.3	4.3.2.4, 4.3.2.4.1, 4.4 & 4.5	Visual, VS & GV	100% Per ST0106AA0040 100%
Glass fiber tape	3.3.3.4	4.3.2.4 & 4.4	Visual, GV	100%
Heat shrinkable sleeving	3.3.3.5	4.3.2.4 & 4.4	Visual, GV	100%

GV - General verification = Verification through one or more of the methods described in 4.4., Verification methods.

VS - Verification to specification.

TABLE III. MARKING TYPE

FINISHED WIRE SIZE, OD, INCH	LETTER SIZE	FACE	TYPE
0.166 to 0.350	8 point	Bold	Curved face
0.096 to 0.165	6 point	Bold	Curved face
0.076 to 0.095	4 point	Bold	Curved face
0.075 to 0.050	4 point	Bold	Vertical reading or curved face
0.049 and smaller	3 point	Bold	Vertical reading or curved face

TABLE IV. PRINTED LABEL TYPES (Polyimide)

TYPE	LENGTH	HEIGHT
Type I - Computer printed	20 characters/inch Optional characters/inch	0.11 Dot Matrix Optional
Type II - Copier printed	Any size	As per drawing or as required
Type III - Barcode printed	9.4 characters/inch 9.4 character/inch 14.0 character/inch Optional character/inch	.115 inch .170 inch .170 inch Optional

TABLE V. INSULATION TYPE VS. MARKING MACHINE TEMPERATURE

INSULATION TYPE	TEMPERATURE, °F
Teflon TFE	425 - 450
Teflon FEP	500 - 525
Polyimide (Kapton)	500 - 525
Kynar (PVF)	500 - 525
Polyamide (Nylon)	410 - 450

TABLE VI
CORRELATION OF ENGINEERING REQUIREMENTS AND QA PROVISIONS (continued)

REQUIREMENTS	REQUIREMENT PARAGRAPH	EVALUATION PARAGRAPH	EVALUATION METHOD	QUANTITY & FREQUENCY
Surface preparations	3.3.4.1	4.4	GV	100%
Characters, figures and symbols	3.3.4.2	4.3.2.4.1	Visual - 10X	100%
Touch-up	3.3.4.3	4.3.2.4	Visual	100%
Marking protection	3.3.4.4	4.4	GV	100%
Protective Coating	3.3.4.4.1	4.4	GV	100%
Process A: General	3.4.1.1	4.4	GV	100%
Process B: Polyester tape (Mylar)	3.4.1.2	4.4	GV	100%
Process C: General	3.4.2.1	4.4	GV	100%
Process D: Identification plates	3.4.2.2	4.4	GV	100%
Process E: Silicone surfaces	3.4.2.3	4.4	GV	100%
Process F: Glass fiber tape, MIL-I-19166	3.4.2.4	4.4	GV	100%
Process G: Polyester tapes (Mylar)	3.4.2.5	4.4	GV	100%
Process H: General	3.4.3.1	4.4	GV	100%
Process H-d: Identification plates	3.4.3.2	4.4	GV	100%
Process H-e: Silicone surfaces	3.4.3.3	4.4	GV	100%
Process H-f: Glass fiber tape, MIL-I-19166	3.4.3.4	4.4	GV	100%
Process H-g: Polyester tape (Mylar)	3.4.3.5	4.4	GV	100%
Process J: Screen printing	3.4.4	4.4	GV	100%
Process K: Hand pen	3.4.5	4.4	GV	100%
Process L: General	3.4.6.1	4.4	GV	100%
Process M: Identification plates and foils	3.4.6.2	4.4	GV	100%

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TABLE VI

CORRELATION OF ENGINEERING REQUIREMENTS AND QA PROVISIONS (continued)

REQUIREMENTS	REQUIREMENT PARAGRAPH	EVALUATION PARAGRAPH	EVALUATION METHOD	QUANTITY & FREQUENCY
Process N: General	3.4.7.1	4.3.2.2.2, 4.3.2.4 & 4.4	Test, visual & GV	10 feet
Process P: Polyimide/FEP (Kapton/Teflon)	3.4.7.2	4.3.2.2.2, 4.3.2.4 & 4.4	Test, visual & GV	10 feet
Process Q: Heat shrinkable sleeving	3.4.7.3	4.3.2.2.3, 4.3.2.4 & 4.4	Test, visual & GV	100%
Process RA: Computer printers	3.4.8.1.1	4.3.2.4 & 4.4	Visual & GV	100% of labels
Process RB: TMS System 90	3.4.8.1.2	4.3.2.4 & 4.4	Visual & GV	100%
Process RC: Thermal transfer printing	3.4.8.2	4.3.2.4 & 4.4	Visual & GV	100%
Process S: Barcode printing	3.4.8.3	4.3.2.4 & 4.4	Visual & GV	100%
Process T: Xerographic printing	3.4.8.4	4.3.2.2.4, 4.3.2.4 & 4.4	Test, visual & GV	100%
Process U: Electrochemical etch	3.4.9	4.4	GV	100%
Process V: Electric arc pencil	3.4.10	4.4	GV	100%
Process W: Engraving	3.4.11	4.4	GV	100%
Process X: Vibration tool	3.4.12	4.4	GV	100%
Process YA: Cold impression stamping, unfilled	3.4.13.1	4.4	GV	100%
Process YB: Cold impression stamping, filled	3.4.13.2	4.3.2.4 & 4.4	Visual & GV	100%
Process Z: Computerized stamping	3.4.13.3	4.4	GV	100%
Workmanship	3.4.14	4.3.2.4	Visual	100%
Legibility	3.4.14.1.1	4.3.2.1	Visual	100%
Durability	3.4.14.1.2	4.3.2.2 & 4.3.2.4	Test methods & visual	100%
Dielectric strength	3.4.14.1.3	4.3.2.3	Wet Hypot test	10' of wire/roll

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REVISION PAGE

MINOR CHANGES AND/OR ADDITIONS ARE INDICATED.

3.1 Changed;

Is: Equipment. The following equipment shall be used. Equipment which produces equivalent or superior results may be used in lieu of that which is listed with written approval from the responsible Boeing - Anaheim Materials and Processes engineer.

Was: Equipment. The following equipment shall be used. Equipment which produces equivalent or superior results may be used in lieu of that which is listed with written approval from the responsible Boeing Company, Anaheim Materials and Processes engineer.

3.3.1 Changed;

Is: Safety and environmental

Was: Safety and environmental. All hazardous materials required herein shall be handled, used and stored as specified in AA0117-004 or when applicable, equivalent supplier procedures.

3.3.1.1 Changed;

Is: Hazardous materials. All hazardous materials shall be handled, used, stored, and disposed of in a manner compliant with AA0117-004 and local, state, and federal regulations.

Was: All hazardous materials shall be used, stored, and disposed of in a manner compliant with local, state, and federal regulations.

3.3.1.2 Changed;

Is: Volatile organic compounds. All materials, including the inks, coatings or other marking materials, thinners, solvents including equipment cleaning chemicals that contain volatile organic compounds (VOCs) or other required air contaminates shall be used (this includes application and curing operations), stored and disposed of in a manner compliant with ...

Was: All materials, including the inks, coatings or other marking materials, thinners, solvents including equipment cleaning chemical that contain volatile organic compounds (VOCs) or other required air contaminates shall be used (this includes application and curing operations), stored and disposed in a manner compliant with local ...

3.3.1.3 Added.

4.3.1.3 Changed;

Is: Hazardous material. Safe handling, usage and storage of hazardous material shall be verified as specified in 3.3.1.1.

Was: Hazardous material. Safe handling, usage and storage of hazardous material shall be verified as specified in AA0117-004 and paragraphs 3.3.1, 3.3.1.1, and 3.3.1.2.

[redacted]

The Boeing Company

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5.2.1.2.1 (a and b), 5.2.1.2.2, 5.2.2.2, and 5.2.2.3 changed; at the end of each paragraph - added "**Acetone may be used on metal surfaces**".

5.5.2.2 Changed;

Is: a. Surfaces should be cleaned using an isopropyl alcohol/naphtha solution (50 ± 10 ppv IPA in naphtha) followed by an isopropyl alcohol rinse. **Acetone may be used on metal surfaces.**

Was: a. Surfaces should be cleaned using an isopropyl alcohol/naphtha solution (50 ± 10 ppv IPA in naphtha) followed by an isopropyl alcohol rinse.

5.11 Changed;

Is: a. Clean area by wiping with a clean cloth saturated with acetone or naphtha/isopropyl alcohol (50/50 by volume). Wipe off solvent with clean cloth or tissues before the solvent evaporates.

Was: a. Clean area by wiping with a clean cloth saturated with naphtha/isopropyl alcohol (50/50 by volume). Wipe off solvent with clean cloth or tissues before the solvent evaporates.

5.11.1 Changed;

Is: NOTE: All substitutions should be approved by the responsible **Boeing - Anaheim** Materials and Processes engineer prior to their use.

Was: NOTE: All substitutions should be approved by the responsible The Boeing Company, Anaheim Materials and Processes engineer prior to their use.

TABLE I Changed;

Is: NOTES: (a) All Type I, inks are **removable by** isopropyl alcohol; the degree of removal depends on the type of surface.

Was: NOTES: (a) All Type I, inks may be removed with isopropyl alcohol; the degree of removal depends on the type of surface.

EXPIRATION DATE FOR THE USE OF THE PREVIOUS REVISION: 11-22-02

OPERATIONS CHANGE ANALYST: Mary J. McBride

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