MIL-L-61002
MILITARY SPECIFICATION

LABELS, PRESSURE-SENSITIVE ADHESIVE, FOR BAR-CODING

1. SCOPE

1.1 Scope. This specification covers the requirements for pressure-sensitive adhesive, labels for use in the implementation of bar code marking/reading operations.

1.2 Classification. The labels furnished in accordance with this specification shall be of the following types, grades, styles and compositions as specified in the Acquisition Document(see 6.2) :

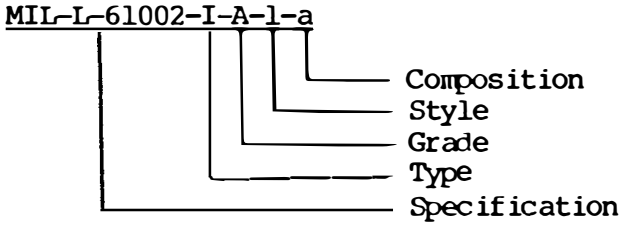
Type I - Blank label sheet(s)
Type II - Blank label roll(s)
Type III - Barcoded label(s) cut on sheet(s)
Type IV - Barcoded label(s) cut on roll(s)
Type V - Special (specify)

Grade A - Multiple Durability Requirements (see 3.2.1)
Grade B - Adhesion, Abrasion, Backing Sheet, and UV-Condensation Requirements Only
Grade C - Adhesion and Backing Sheet Requirements Only
Grade D - Special Durability Requirements (Specify)

Style 1 - Non-Porous Surfaces
Style 2 - Porous Surfaces
Style 3 - Special Surfaces (i.e., styrofoam, rubber, composites)

Composition a - Paper (with or without laminate)
Composition b - Plastic (with or without laminate) (includes materials such as polyester, mylar, vinyl, etc.)
Composition c - Polyimide (with or without laminate)
Composition d - Metal (specify) (includes steel, anodized aluminum, etc.)
Composition e - Anodized, Photo Sensitive, Aluminum (matte finish)
Composition f - Ceramic
Composition g - Special (specify)

1.3 Part Numbering System. The following numbering system shall be utilized to identify the labels procured through this specification :



2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

A-A-17 - Detergent, Laboratory Glassware
O-T-620 - Trichloroethane - 1,1,1, Technical, Inhibited (Methyl Chloroform)
UU-P-268 - Paper, Kraft, Wrapping
PPP-B-601 - Boxes, Wood, Cleated Plywood
PPP-B-621 - Box, Wood, Nailed and Lock-Corner
PPP-B-636 - Box, Shipping, Fiberboard
PPP-B-640 - Box, Fiberboard, Corrugated, Triple-Wall
PPP-F-320 - Fiberboard, Corrugated and Solid, Sheet Rock (Container Grade), and Cut Shapes

MILITARY

MIL-B-117 - Bag, Sleeve and Tubing
MIL-B-131 - Barrier Material, Water-Vaporproof, Greaseproof, Flexible, Heat-Sealable

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-1189 - Standard Department of Defense Bar Code Symbology

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.2 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense (DOD) adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 117 - Salt Spray (Fog) Testing
ASTM D 4060- Standard Test Method for Abrasion Resistance of Organic Coatings by the Tabor Abaser
ASTM D 3330- Standard Test Methods for Peel Adhesion of Pressure-Sensitive Tape at 180° Angle
ASTM G 26 - Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM G 53 - Standard Practice for Operating Light - And Water-Exposure Apparatus (Fluorescent UV-Condensation Type) For Exposure of Nonmetallic Materials.
ASTM D 3951- Standard Practice for Commercial Packaging.

(Application for copies of ASTM publications should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1137.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General requirements.

3.1.1 Materials. The labels shall be manufactured from such materials and by such processes as to insure compliance with this specification.

3.1.2 Design. The labels shall be designed to insure compliance with this specification for the specified type, grade, composition, and style. Blank label stock shall not require a laminate. A laminate may be required to meet the durability requirements for a given grade of preprinted label. When a laminate is used, the final composite label design shall be designated by its basic substrate material and tested as a composite unit label. (See 1.2).

3.1.3 Construction. The labels shall be made from materials conforming to 3.1.1. The labels shall be completely coated on the back side with a uniform film of adhesive and shall be mounted on a backing sheet. The labels shall be furnished in the form of individual labels, sheets or rolls, as specified in the Acquisition Document (see 6.2). Labels furnished in sheet form shall be die-cut to facilitate removal of individual labels from the backing sheet. Types II and IV labels furnished in roll form shall be die-cut or butt-cut and shall be individually attached to a backing sheet strip which is uniformaly wound on a convolute or spiral wound paperboard core. The quantity of labels per sheet or roll shall be in accordance with standard commercial practice unless otherwise specified in the Acquisition Document (see 6.2). Exceptions to the above mentioned core are the compositions (see 1.2) which are too rigid to be wound. Thickness of the label stock shall be in accordance with standard commercial practice unless otherwise specified in the Acquisition Document (see 6.2).

3.1.4 Printed symbol. Types III, IV and V (if applicable) labels shall be printed with standard DOD symbology as defined in MIL-STD-1189. The encoded message, code density and bar height of the bar code symbol shall be as specified in the Acquisition Document (see 6.2). The human-readable text shall also be specified when it is different than the encoded message. Some marking technologies generate better bar codes. If specific technologies are to be or not to be used, the requirement shall be specified in the Acquisition Document (see 6.2). Scanner wavelength response, if other than 633nm, shall also be specified in the Acquisition Document (see 6.2).

3.1.5 Print requirements. The bar code symbol parameters (reflectance, print contrast and dimensions) will be printed in accordance with MIL-STD-1189.

3.1.6 Adhesive. The adhesive shall be pressure-sensitive, water insoluble, and shall require no moisture, heat, or other preparation prior to, or after application to, clean, dry surfaces. Any other surface conditions or method of application shall be specified. There shall be no excessive bleeding of adhesive from the edges of the labels (see 6.2).

3.1.7 Application temperature. The adhesive being utilized must conform to the characteristics of the specified grade and style (see 1.2) between 40°F and 110°F. If the labels are to be applied at temperatures lower than 40°F or higher than 110°F, the procuring activity will specify the application, surface and overall environmental temperatures as to meet this specification (see 6.2).

3.1.8 Backing sheet. The backing sheet shall be coated with a release coating of silicone, fatty acid metal complexes, acrylic polymer, or equivalent.

3.1.9 Dimensions.

3.1.9.1 Labels. The length and width dimensions of the individual labels shall be as specified in the Acquisition Document (see 6.2). The tolerance on dimensions up to and including 3.0 inches (76.2mm) shall be plus or minus 0.0312 inch (0.794mm). Dimensions over 3 inches the tolerance shall be plus or minus 0.0625 inch (1.588mm). All tolerances shall be maintained unless otherwise specified.

3.1.9.2 Sheets. When the labels are furnished in sheet form, the length and width dimensions of the individual sheets of labels shall be specified in the Acquisition Document (see 6.2). If not specified, the contractor shall make the decision based on standard manufacturing practice.

3.1.9.3 Rolls. When the labels are furnished in roll form, the paperboard core of the roll shall have a minimum inside diameter of 3.0 inches (76.2mm) with a tolerance of $\pm$ 0.0625 inch (1.588mm), unless otherwise specified in the Acquisition Document (see 6.2). The width of the core, shall have a tolerance $\pm$ .0625 inch (1.588mm) or as specified in the Acquisition Document (see 6.2) and shall be no smaller than the width of the roll.

3.1.10 Color. Unless otherwise specified in the Acquisition Document (see 6.2), the labels shall have a white background with black printing. In all cases, the bar reflectance and print contrast signal of the bar code symbol shall conform to MIL-STD-1189.

3.1.11 Workmanship. Labels shall be free of adhesive on the printed surface. Label edges shall be smooth and clean cut. The labels shall be free from lint, dust, grit, spots, wrinkles, folds, holes, tears and other imperfections. The backing sheet shall be free of die-cuts, slits, or any other defect that may affect serviceability.

3.1.12 Storage Markings. All packages of labels shall be marked with the type of storage, temperature range, and shelf-life (to include last usable date) that is required to ensure proper storage of the label stock(s). Also, due to some adhesives' short shelf life, the contractor shall specify for each delivery the date when the adhesive was purchased. Labels, with adhesive that was purchased more than three months prior to the date of delivery, will not be accepted unless the procuring agency is prepared to use the labels before the expiration of the shelf-life date.

3.2 Performance requirements.

3.2.1 Label Grades. The grade of label shall meet the following performance requirements:

Grade A -	UV-condensation	Adhesion	Abrasion resistance
	Backing sheet	Salt Fog	Solvent resistance
			Detergent resistance
Grade B -	Backing sheet	Adhesion	UV-condensation
			Abrasion Resistance

Grade C - Backing Sheet Adhesion

Grade D - As specified in Acquisition Document (see 6.2)

3.2.2 Performance test parameters. When tested as specified in 4.6 1, the labels shall show no evidence of smearing or erosion of the bar-coded symbol, delamination, loss of adhesion, discoloration, wrinkling, cracking, or any effect which is detrimental to the bar-coded symbol or the adhesion of the test labels to the test panel. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.2 Heat aging. When tested as specified in 4.6.2, the labels shall show no evidence of smearing or erosion of the bar-coded symbol, delamination, loss of adhesion, discoloration, wrinkling, cracking, or any other effect which is detrimental to the bar-coded symbol or the adhesion of the test labels to the test panel. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.3 Solvent resistance. When tested as specified in 4.6.3, the labels shall show no evidence of smearing or erosion of the bar-coded symbol, delamination, loss of adhesion, discoloration, wrinkling, cracking, or any other effect which is detrimental to the bar-coded symbol or the adhesion of the test labels to the test panel. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.4 Detergent resistance. When tested, as specified in 4.6.4, the labels shall show no evidence of smearing or erosion of the bar-coded symbol, delamination, loss of adhesion, discoloration, wrinkling, cracking, or any other effect which is detrimental to the bar-coded symbol or to the adhesion of the test labels to the test panel. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.5 Salt fog. When tested as specified in 4.6.5, the labels shall show no evidence of smearing or erosion of the bar coded symbol, delamination, loss of adhesion, discoloration, wrinkling, or any other effect which is detrimental to the bar-coded symbol or to the adhesion of the test labels to the test panel. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.6 Solar Radiation. When tested as specified in 4.6.6, the labels shall show no evidence of smearing or erosion of the bar-coded symbol, delamination, loss of adhesion, discoloration, wrinkling, or any other effect which is detrimental to the bar-coded symbol or to the adhesion of the test labels to the test panel. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.7 Accelerated weathering.

3.2.2.7.1 After 24 hours. When tested as specified in 4.6.7 after 24 hours of exposure, the labels shall show no evidence of smearing or erosion of the bar-coded symbol, delamination, loss of adhesion, discoloration, wrinkling, cracking, or any other effect which is detrimental to the readability of the bar-coded symbol or to the adhesion of the test labels to the test panels. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the test shall be terminated.

3.2.2.7.2 After 300 hours. (Grade A only) when tested as specified in 4.6.7 after 300 hours of exposure, labels shall conform to the requirement of 3.2.2.7.1. Barcoded labels shall also be readable and conform to the reflectivity and print contrast requirements of MIL-STD-1189. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.8 Adhesion. When tested as specified in 4.6.8. all labels shall have remained attached to the test panels for the specified time. Nonconformance to this requirement constitutes failure and the performance test shall be terminated.

3.2.2.9 Backing Sheet. When tested as specified in 4.6.9, the release coating shall allow deliberate manual or automatic peel off of the label without any sign of delimination or tearing of the label or backing sheet. Also when tested, as specified in 4.6.9, the release coating shall prevent accidental peel off or separation of the label from the backing sheet.

3.2.2.10 Ultraviolet (UV) light/condensation. When tested as specified in 4.6.10, the labels shall show no evidence of smearing or erosion of the bar coded symbol, delamination, loss of adhesion, discoloration, wrinkling, cracking, or any other effect which is detrimental to the bar coded symbol or the adhesion of the test labels to the test panels. Bar coded labels shall be machine-readable and shall conform to the reflectivity and print contrast requirements of MIL-STD-1189. Non-conformance to this requirement constitutes failure and the performance test shall be terminated.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The contractor shall submit a written certification that supplied labels conform to the requirements of the acquisition document and a written finding if any Quality Conformance Inspections are required by section 4.4 of this military specification. For each subsequent delivery of labels under the contract, a written diagnostic finding may be requested by the procuring activity for ten random selected labels. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspection. The inspection requirement specified herein is classified as: quality conformance inspection.

4.3 Quality conformance inspection. Quality conformance inspection shall be as specified in Table I.

4.3.1 Inspection of product for delivery. Inspection of product for delivery shall consist of Groups A and B inspections.

4.3.1.1 Inspection lot. An inspection lot shall consist of only those labels produced under essentially the same conditions offered for inspection at one time.

4.3.2 Group A inspection. Group A inspection shall consist of the inspections specified, as such, in Table I and shall be made on the same set of sample units. Group A inspection applies to all types of labels.

4.3.2.1 Sampling plan. Sampling procedures and inspection shall be in accordance with MIL-STD-105. The suggested sampling criteria is as follows: S2 Nominal AQL 4%.

4.3.2.2 Rejected lots. If an inspection lot is rejected, the procuring agency may allow the manufacturer to rework it to correct the defects or screen out the defective units and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

4.3.3 Group B inspection. Group B inspection shall consist of the inspections specified, as such, in Table I and shall be made on sample units which have been subjected to, and have passed, the Group A inspection. Group B inspection applies to Types III, IV, and V (when applicable).

4.3.3.1 Sampling plan. Sampling procedures and inspection shall be in accordance with MIL-STD-105. The suggested sampling criteria is a follows: S2 Nominal AQL 4%.

4.3.3.2 Disposition of Sample Units. Sample units which have been subjected to Group B inspection shall not be delivered on the contract.

4.3.3.3 Rejected lots. If an inspection lot is rejected, the procuring agency may allow the manufacturer to rework it to correct the defect or screen out the defective units and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

4.3.4 Group C inspection. Group C inspection shall consist of the tests specified, as such, in Table I. Group C inspection shall be made on sample units selected from inspection lots which have passed the Groups A and B inspections. Group C inspections shall correlate to the label grade requirements as outlined in 3.2.1.

4.3.4.1 Sampling plan. Sampling procedures and inspection shall be in accordance with MIL-STD-105. The suggested sampling criteria is as follows: S2 Nominal AQL 4%.

4.3.4.2 Disposition of Sample Units. Sample units which have been subjected to Group C inspection shall not be delivered on the contract.

TABLE I. Quality conformance inspection

Inspection	Requirement Paragraph	Examination or Test Paragraph
Group A		
Dimensions	3.1.9.1, 3.1.9.3, 3.1.9.2	4.5.1
Visual	3.1.2, 3.1.5, 3.1.9 3.1.3, 3.1.6, 3.1.10 3.1.4, 3.1.7, 3.1.11, 3.1.8 3.1.12.	4.5.1
Group B		
Bar Coding Parameters	3.1.4, 3.1.5	MIL-STD-1189
Backing Sheet	3.2.2.9	4.6.9
Group C		
Abrasion Resistance	3.2.2.1	4.6.1
Heat Aging *	3.2.2.2	4.6.2
Solvent Resistance	3.2.2.3	4.6.3
Detergent Resistance	3.2.2.4	4.6.4
Salt Fog	3.2.2.5	4.6.5
Solar Radiation *	3.2.2.6	4.6.6
Accelerated Weathering *	3.2.2.7	4.6.7
Adhesion	3.2.2.8	4.6.8
Ultra-Violet/ Condensation	3.2.2.10	4.6.10
Miscellaneous (as specified in the Acquisition Document)	As specified	As specified

*When Specified
(See 6.2)

4.4 Inspection "criteria".

4.4.1 Noncompliance. If a sample fails to pass Group C inspection, the manufacturer shall notify the qualifying activity and the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which are manufactured under essentially the same materials and processes, and which are considered subject to the same failures. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity, has been taken. After the corrective action has been taken, Group C inspection shall be repeated on additional sample unit(s) (all tests and examinations, or the test which the original sample failed, at the option of the qualifying activity). Groups A and B inspections may be reinstituted; however, final acceptance and shipment shall be withheld until the Group C inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity.

4.4.2 Periodic inspection. Periodic inspections may be required at the discretion of the contracting officer when indications of quality deterioration related to Group C inspections are suspected. Except where the results of these inspections show non compliance with the applicable requirements (see 4.4.1), delivery of products which have passed Groups A and B inspections shall not be delayed pending the results of these periodic inspections.

4.4.3 Inspection of packaging. The sampling and inspection of the preservation and interior package marking shall be in accordance with Groups A and B quality conformance inspection requirements in section 5 of this specification. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification shown in Section 5 of this specification and marking requirements of MIL-STD-129.

4.5 Methods of inspection.

4.5.1 Examination for dimensional and visual defects. All labels shall be examined for the defects listed in 4.5.1.1. and 4.5.1.4. Sheets or rolls shall be examined for the defects listed in 4.5.1.2 or 4.5.1.3, respectively.

4.5.1.1 Labels. The sample unit shall be one label. Sample units shall be examined for the following defects:

101. Materials, design, or construction, not as specified.

102. Label, not completely coated on the back side with a uniform film of adhesive.

103. Label, not mounted on a backing sheet.

104. Label, not furnished in the specified form (sheets or rolls).

105. Printed symbol, not standard DOD symbology. (Types III, IV, and V (if applicable)).

106. Message encoded information in the printed symbol, not as specified. (Types III, IV, and V (if applicable)).

107. Bar code symbol missing. (Types III, IV, and V (if applicable)).

108. Human-readable interpretation missing, or does not represent the characters encoded in the bar code symbol. (Types III, IV, and V (if applicable)).

109. Symbol, not printed in accordance with MIL-STD-1189. (Types III, IV, and V (if applicable)).

110. Adhesive, not pressure-sensitive, or as specified.

111. Adhesive requires moisture, heat, or other preparation prior to, or after application to, clean, dry surfaces.

112. Label does not tack upon contact with the specified test surface(s).

113. Backing sheet, not coated with a release coating as specified.

114. Label or backing sheet delaminates or tears when the label is manually peeled from the backing sheet.

115. Labels indicate separation from the backing sheet as received.

116. Dimensions of label, not as specified.

117. Dimensions of label, not within the tolerance applicable to the specified dimensions.

118. Density or bar height of the bar code symbol, not as specified. (Types III, IV, and V (if applicable)).

119. Color, not as specified.

120. Workmanship, not as specified.

4.5.1.2 Sheets. The sample unit shall be one sheet. Sample units shall be examined for the following defects:

121. Labels, not die-cut or butt-cut (as specified).

122. Quantity or format of labels per sheet, not as specified.

123. Dimensions of the individual sheets of labels, not as specified.

4.5.1.3 Rolls. The sample unit shall be one roll. Sample units shall be examined for the following defects:

124. Labels, not die-cut or butt-cut (as specified) and individually attached to the backing sheet strip.

125. Label stock not continuous or contains splices.

126. Backing sheet strip with labels, not uniformly wound on the paperboard core.

127. Core, missing or not as specified.

128. Quantity of labels per roll, not as specified.

129. Inside diameter of core, not within tolerance, or as specified.

130. Width of core, not equal to the width of the roll, or within specifed tolerances.

4.5.1.4 Package. The sample unit shall be one unit package. Sample units shall be examined for the following defects.

132. Type of storage and temperature range not marked on package.

133. Shelf Life, not marked on package.

134. Shelf Life, exceeded or not acceptable.

4.6 Performance tests.

4.6.1 Abrasion resistance.

4.6.1.1 Apparatus. The apparatus shall consist of a Teledyne-Taber abrasion tester (see 6.8) as described in ASTM D 4060 (Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser).

4.6.1.2 Standard Conditions. Standard conditions shall be a temperature of 73.5°F. ± 2°F. and a relative humidity at that temperature of 50 ± 4 percent.

4.6.1.3 Preparation of test labels. Prior to testing, the test label and specimen mounting sheets shall be conditioned for a minimum of 24 hours in an atmosphere maintained at standard conditions (see 4.6.1.2).

4.6.1.4 Method. Test labels shall be attached to Teledyne Tabor S-16 specimen mounting plates and trimmed to conform to the abraser turntable. Labels shall be positioned such that the abrasion path of the abrading wheel covers a maximum area of the bar-coded symbol. The specimen mounting plate shall then be secured to the abraser turntable and the vacuum nozzle shall be adjusted for approximately 0.0312 inch (0.794mm) clearance from the unobstructed label surface with the vacuum level set at maximum. For Grade A labels, each test label shall be abraded for 500 cycles using the CS-10 or CS-10F Calibrase abrading wheel and a 500 gram weight on each wheel. For Grade B labels, each test label shall be abraded for 100 cycles using a 250 gram weight on each wheel. After test completion, the labels shall be examined for compliance to 3.2.2.1. For Grade C labels, each test label shall be abraded for 10 cycles using a 250-gram weight on each wheel. After test completion, the labels shall be examined for compliance to 3.2.2.1.

4.6.2 Heat aging.

4.6.2.1 Apparatus. The apparatus shall consist of a forced air circulating oven capable of maintaining 150°F.± 2°F. (Other temperatures and applicable equipment may be specified.)

4.6.2.2 Standard Conditions. Standard conditions shall be a temperature of 73.5°F. ± 2°F. and a relative humidity at that temperature of 50 ± 4 percent.

4.6.2.3 Preparation of test labels and test panels. Prior to testing, test label and test panels shall be conditioned for a minimum of 24 hours in an atmosphere maintained at standard conditions (see 4.6.1.2). Test panels for Style 1 labels shall be cleaned with diacetone alcohol (non-residual, technical grade or better) using a lint-free absorbent material such as surgical gauze, wiped dry with fresh absorbent material, and cleaned twice again with 95% methyl alcohol and fresh absorbent material. Test panels for Styles 2 and 3 labels shall be wiped free of dust and other surface contaminates using 95% methyl alcohol and lint-free absorbent material, such as surgical gauze. The test specimen shall be prepared by applying a total of five labels to the material by rolling each label once in each lengthwise direction on a smooth, hard, flat surface using a 4.5 pound steel rubber-covered roller as described in ASTM D 3330. The cylindrical surface of the roller shall be a true surface void of any concave or convex deviations so that the roller will apply uniform pressure across the width of the entire surface.

4.6.2.4 Method. The test specimen shall be suspended vertically in an air-circulating oven and shall be conditioned for a period of 7 days at 150°F.± 2°F. At the end of the conditioning period, the specimen shall be removed from the oven and the labels shall be examined immediately to determine compliance with 3.2.2.2.

4.6.3 Solvent resistance.

4.6.3.1 Preparation of test labels and test panels. Test labels and test panels shall be prepared as specified in 4.6.2.3.

4.6.3.2 Method. The test specimens shall be immersed for 15 minutes ± 1 minute in the 1, 1, 1 trichloroethane (technical grade) conforming to O-T-620. The solvents shall be maintained at 75°F. ± 10°F. At the end of the soaking period, the labels shall be removed from the solvent, and the labels shall be examined immediately to determine compliance to 3.2.2.3. If a test panel has not been specified, smooth plate glass panels approximately 3 by 9 inches in size will be used. The test shall be repeated using other solvent(s) specified in the Acquisition Document (see 6.2 Table 2).

4.6.4 Detergent resistance.

4.6.4.1 Preparation of test labels and test panels. Test labels and test panels shall be prepared as specified in 4.6.2.3.

4.6.4.2 Method. The test specimens shall be immersed for 15 minutes ± 1 minute in a solution of 20 grams of detergent powder, conforming to A-A-17 (NSN 7930-00-588-1111) dissolved in 1,000 ml of distilled water. The detergent solution shall be maintained at a temperature of 120°F. ± 10°F. during the soaking period. At the end of the soaking period, the test specimens shall be removed from the detergent solution, and the labels shall be examined immediately to determine compliance to 3.2.2.4. If a test panel has not been specified, smooth plate glass panels approximately 3 by 9 inches in size will be used.

4.6.5 Salt fog exposure.

4.6.5.1 Apparatus. The apparatus shall consist of a salt spray cabinet as described in ASTM B 117, or equivalent.

4.6.5.2 Preparation of test labels and test panels. Test labels and test panels shall be prepared as specified in 4.6.2.3.

4.6.5.3 Method. The test specimens shall be positioned horizontally in the salt chamber with the label side up and shall be exposed to a salt fog for a period of 96 hours ± 10 hours in accordance with ASTM B 117. At the end of the exposure period, the specimens shall be removed from the salt spray chamber and within 10 minutes, shall be gently washed or dipped in clean running water not warmer than 100°F. to remove salt deposits from the surfaces. The test specimens shall be air-dried for 48 hours ± 2 hours in an atmosphere maintained at standard conditions (see 4.6.1.2). At the end of the drying period, the labels shall be examined for compliance to 3.2.2.5. If a test panel has not been specified, use smooth plate glass panels, approximately 3 by 9 inches in size.

4.6.6 Solar radiation.

4.6.6.1 Apparatus. The apparatus shall consist of xenon-arc light-exposure chamber conforming to ASTM G 26.

4.6.6.2 Preparation of test labels and test panels. Test labels and test panels shall be prepared as specified in 4.6.2.3.

4.6.6.3 Method. The test specimens shall be tested in the light-exposure chamber and exposed for a total of 300 hours ± 1 hour in accordance with ASTM G 26, method C. At the end of the exposure period, the labels shall be examined for compliance to 3.2.2.6. If a test panel has not been specified, use solid fiberboard panels (conforming to PPP-F-320, type SF, class weather-resistant), approximately 3 by 9 inches in size.

4.6.7 Accelerated weathering.

4.6.7.1 Apparatus. The apparatus shall consist of an xenon-arc light-exposure chamber conforming to ASTM G 26 and environmental chamber capable of maintaining 32°F., 73°F. with 50 percent relative humidity (RH), and 120°F. with 90 percent RH. Conditions shall be maintained within a ± 5% tolerance.

4.6.7.2 Preparation of test labels and test panels. The appropriate test panels shall be cleaned as specified in 4.6.2.3. If a test panel has not been specified, use smooth plate glass panels, approximately 3 by 9 inches in size. Fifteen test labels will be required for this test. Five labels, their test panels, and a 4.5 pound steel, rubber-covered roller shall be preconditioned at 32°F. for 24 hours ± 1 hour. After preconditioning, the labels shall be applied to the test panels while remaining in the environmental chamber by rolling each label once in each lengthwise direction with the roller. The labels shall be further conditioned by remaining in the environmental chamber at the same condition for an additional 24 hours ± 1 hour. At the end of this conditioning period, labels shall be transferred to the light-exposure chamber and exposed for 300 hours ± 10 hours in accordance with ASTM G 26, method A. The same procedure shall be followed with a second set of five labels which shall be preconditioned at 73°F. and 50 percent RH, and for a third set of five labels which shall be preconditioned at 120°F. and 90 percent RH.

4.6.7.3 Method. Test labels shall be prepared, preconditioned, and placed in a solar light-exposure chamber in accordance with 4.6.7.2. After 24 hours of exposure, the labels shall be temporarily removed from the chamber and examined for compliance to 3.2.2.7.1. Labels shall then be returned to the chamber for the remainder of the required 300 hours of exposure. At the end of the 300 hour exposure period the labels shall be removed and examined for compliance to 3.2.2.7.2.

4.6.8 Adhesion.

4.6.8.1 Apparatus. The apparatus shall consist of a holding fixture that will rigidly support test panels with their label mounting surfaces in a horizontal position.

4.6.8.2 Standard Conditions. Standard conditions shall be a temperature of 73.5°F. ± 2°F. and a relative humidity at that temperature of 50 ± 4 percent.

4.6.8.3 Preparation of test labels and test panels. Prior to testing, test label and test panels shall be conditioned for a minimum of 24 hours in an atmosphere maintained at standard conditions (see 4.6.8.2). Style 1 test panels (stainless steel) as specified in ASTM D 3330 shall be cleaned with diacetone alcohol (non-residual, technical grade or better) using a lint-free absorbent materiel such as surgical gauze, wiped dry with fresh absorbent material, and cleaned twice again with 95% methyl alcohol and fresh absorbent material. Style 2 test panels (PPP-F-320, class weather resistant, Grade V3c, corrugated fiberboard) shall be wiped free of dust and other surface contaminates using 95% methyl alcohol and lint-free absorbent material, such as surgical gauze. Style 3 test panels (see 6.2) shall be wiped free of dust and other surface contaminates using 95% methyl alcohol and lint-free absorbent material, such as surgical gauze.

4.6.8.4 Method. Before removal from their release liners, each label shall be trimmed lengthwise to 0.5 inch (12.7mm) width (if applicable). Place a 1 inch by 2 inch (25.4mm by 50.8mm) strip of Kraft paper (conforming to UU-P-268), or equivalent, on a cleaned surface of the test panel. Peel each test label from its release liner and gently place the label, adhesive side down, on a test panel and over the 1 inch (25.4mm) edge of Kraft paper such that approximately 1.125 inch (28.575mm) of the label is in contact with the test panel and the remaining length of test label is on the kraft paper and approximately centered with the 1 inch (25.4mm) edge. Secure the test label to the test panels and Kraft paper strips by rolling each label once in each lengthwise direction with a steel, rubber-covered roller as described in 4.6.2.3. If any bubbles or wrinkles appear on the label, discard it and replace it with a new one using the same procedure. Place the panels with the labels on the bottom surface in the holding fixture and gently attach a 25 gram ± 1 gram weight to the free end of the Kraft paper strips such that the line of force of the 25 gram weight and the test panel form an angle of approximately 90 degrees. The weight shall remain as a peeling force for 4 hours ± 5 minutes after which the labels shall be examined for compliance to 3.2.2.8.

4.6.9 Backing sheet requirements.

4.6.9.1 Deliberate peel off. When the label material with backing is passed over an edge with a maximum diameter of 0.0625 inch (1.599mm), and at a minimum angle of 90^{o}, the label will freely self-peel from the backing material. There shall be no delamination or tearing of the label or the backing sheet.

4.6.9.2 Accidental peel off. When the label is passed over the outside of an object with a convex surface having a diameter of 1 inch (25.4mm) +0.125 inch (3.175mm), and at an angle of $45^{o} \pm 5^{o}$, the label shall not show any signs of peeling from the backing sheet.

4.6.10 Ultraviolet (UV) light/condensation.

4.6.10.1 Apparatus. Apparatus shall be as specified in ASTM G 53.

4.6.10.2 Preparation of test labels and test panels. Test labels and test panels shall be prepared as specified in 4.6.2.3 and ASTM G 53. Porous test panels, such as wood and fiberboard, shall be backed with MIL-B-131 barrier material.

4.6.10.3 Method. The test specimens shall be positioned in the test chamber and tested in accordance with the procedure specified in ASTM G 53. Exposure time shall be a total of 96 hours using an 8-hour repeating program cycle of 4 hours of UV light and $60^{o}C$ followed by 4 hours of condensation at $50^{o}C$. At the end of the exposure period, the labels shall be examined for compliance to 3.2.2.10.

5. PACKAGING

5.1 Preservation. Preservation shall be level A, B, or C as specified (see 6.2).

5.1.1 Level A. Sheets or rolls of the same class and size shall be unit packed in increments of 50, up to 1000. Sheet labels in the quantities specified (see 6.2) shall be bundled by sandwiching between two fiberboard pads conforming to PPP-F-320. Bundles of sheet labels or rolls of labels shall be placed in a heat sealed bag conforming to type I, class E, style 1 of MIL-B-117. Intermediate containers shall conform to PPP-B-636, style RSC, type CF, grade W5C, class W-R. Closure shall be in accordance with the appendix of the applicable specification.

5.1.2 Level B. Level B preservation shall be the same as Level A, except that the bag may conform to type II, class C, style 1 of MIL-B-117.

5.1.3 Level C. Preservation shall be in accordance with ASTM-D 3951.

5.2 Packing. Packing shall be level A, B, or C as specified (see 6.2).

5.2.1 Level A. Labels packaged as specified in 5.1.1 shall be packed in containers conforming to PPP-B-601, type overseas, style optional, grade B or PPP-B-621, class 2, style 1, 2, 4 or 5, grade B. When practicable, containers shall be uniform shape and size, of minimum cube and tare, and containing identical quantities.

5.2.2 Level B. Labels preserved as specified in 5.1.1 or 5.1.2 shall be packed in containers conforming to PPP-B-636, style RSC, type CF, grade W5C, class W-R, or PPP-B-640 class 2, style E. Closure shall be in accordance with the appendix of the applicable specification. When practicable, containers shall be of uniform size and shape, of minimum cube and tare, and containing identical quantities.

5.2.3 Level C. Packing shall be in accordance with ASTM-D 3951.

5.3 Marking. All unit, intermediate, and exterior containers shall be marked in accordance with MIL-STD-129 and any markings required by the acquisition document such as date of manufacture and shelf-life from the date of manufacture (see 6.2 and 4.5.1.4).

6. NOTES
(This section contains information of a general or explanatory nature that may be helpful, but it is not mandatory.)

6.1 Intended use.

6.1.1 Intended use of this specification. The following basic considerations summarize the intended use of this specification:

a) Consider the Type, Grade, Composition and Style of the intended label (see 1.2). Selecting the grade will automatically affect the composition (i.e., paper labels will not satisfy Grade A requirements).

b) Consider the Classification of inspections (see 4.2). When Quality conformance inspection is chosen, then the procuring activity must choose the Performance tests from Table I (see 4.5).

c) Consider the Preservation (see 5.1) or the Packing (see 5.2); if other than Level C is chosen for preservation or packing the procuring agency must decide what is necessary to insure safe storage and delivery. Most adhesives only have a 6-12 month shelf life.

6.1.2 Intended use of the labels. These labels are intended for use in the bar code marking/reading operations within the military logistics system. These labels may be applied to all styles of classification. Refer to Table II and III for guidance when determining the classification of labels. The tables are intended to be very basic and generic in nature.

6.1.2.1 Application factors. Some factors to consider when specifying labels:

a) Environment (see 3.2.1 Grades)
b) Applied Surface (smooth, rough)
c) Application Temperature (if less than 40°F)
d) Surface Temperature (e.g., frozen or refrigerated)
e) Label Permanency (permanent or temporary)
f) Service temperature
g) Solvent Resistance (see Table VI)
h) Tampering (destructible or tamper evident)
i) Pilferable (omit HRI)
j) Label Life
k) Performance requirements (see Label Grades 3.2.1)

6.1.2.2 Label drawing. A sketch of the label should be included with the procurement document. The size of the label is one of the most important aspects to be considered.

TABLE II. Bar Code Label Considerations

Item	Label Construction Substrate	Laminate	Additional Considerations
	PAPER		(Example - 61002-IIB2a)
1A	70# Paper	P-propylene	Least expensive durable label. Cardboard, smooth surfaces.
1B	70# Paper	P-propylene	For frozen environments.
1C	70# Paper	P-propylene	Removable adhesive.
1D	T.Transfer	P-propylene	Thermal transfer printing.
	THERMAL PAPER		(Example - 61002-IIC2a)
2A	Thermal	N/A	Buff colored label. For indoor use only.
2B	Thermal	N/A	For low temperature or frozen environments.
2C	Thermal	N/A	For "no stick" surfaces.
2D	Thermal	N/A	Removable adhesive; can be repositioned.
	VINYL		(Example - 61002-IIIA1b
3A	Vinyl	P-propylene	Most economic choice for intermittent outdoor exposure.
3B	Vinyl	P-propylene	For "no stick" and textured surfaces (office equipment, etc.).
3C	Vinyl	P-propylene	Removable adhesive. Can be repositioned.
3D	Vinyl	P-propylene	Good for most untreated metal surfaces.
3E	Destructible	P-propylene	For destructible asset management labels.
3F	PVF	PVF	UV resistant label for extended outdoor use.
3G	PVF	PVF	UV resistant label for outdoor use, esp. untreated metal.
	SPECIAL PLASTICS		(Example - 61002-IIA1q)
4A	P-propylene	P-propylene	Substitute for 3A. Better tear resistance.
4B	P-propylene	P-propylene	Acid resistant. Especially good for "no stick" surfaces.
4C	Acrylic	PVF	UV resistant label for extended outdoor use.
4D	---	RED	Red overlaminating film for "photocopy proof" labels.
4E	---	BLACK	Black overlaminating film for non-human readable labels.

TABLE II. Bar Code Label Considerations - continued

Item	Label Construction Substrate	Laminate	Additional Considerations
	POLYESTER (PE)		(Example - 61002-IIA1b)
5A	Polyester	Polyester	Best all around durable label.
5B	Polyester	Piggyback	Used for painting, staining operations.
5C	Metallized	Polyester	Metal tag appearance - asset management.
5D	Met. "VOID"	Polyester	Metal tag appearance - asset management; tamper evident.
5E	White "VOID"	Polyester	Asset management; tamper evident.
5F	Polyester	Polyester	For automatic application. Same properties as 5A.
5G	Polyester	Polyester	Autoclave resistant. Excellent for glass surfaces.
5H	Polyester	Polyester	For untreated metal surfaces.
5I	Polyester	PVF	UV resistant label for extended outdoor use.
5J	High Temp PE	Polyester	Non-solder side of PCBs during manufacturing process.
5K	High Temp PE	Polyester	Non-solder side of PCBs; laminate on backing paper.
5L	High Temp PE	Polyimide	Low cost alternative for solder side of PCBs.
	POLYIMIDE		(Example - 61002-IIIA2c)
6A	Polyimide	Polyimide	General use for solder side use in PCB manufacture.
6B	Polyimide	Polyimide	Higher temperatures than 6A.
6C	Polyimide	Polyimide	Highest temperature performance for solder side of PCBs.

NOTES: USE OF TABLE. The first consideration in each group pertains to the entire group. The additional comments in each group should be considered separately as each individual requirement will affect the type of adhesive to be used. In general each succeeding group is more durable and more expensive. The example classifications are given only for the basic group. The additional considerations would have to be specified as they would affect the type of adhesive required and whether or not the label would require a laminate.

PVF - polyvinyl fluoride

Adhesive Thickness - Surface roughness should be considered when specifying adhesive thickness. Some suggested thicknesses are 2 mils for pebble grain office equipment, 2-3 mils for wood surfaces, and 5 mils for exterior use on military vehicles.

Table III. Relative Label Environmental Suitability

Label Mtl	Service Temp Range (deg F) 1/	Abrasion Resist	UV Resist	Moist Resist	Salt Fog Resist	Svc Life 2/
Paper, (Thermal)	-50 to 140	Fair	Poor	Poor	Poor	< 1 yr
Paper w/o Laminate	-50 to 140	Poor	Fair	Poor	Poor	< 1 yr
Paper with Laminate	-50 to 140	Good	Fair	Fair	Fair	1-3 yr
Plastic w/o Laminate	-50 to 200	Poor	Good	Good	Good	1-3yr
Plastic w/Laminate	-50 to 200	Very Good	Good	Very Good	Very Good	1-3 yr
Polyimide	-50 to 600+ short duration	Poor w/o Lam	Good	Good	Good	1-5 yr
PVF	-50 to 200	Poor w/o Lam	Excellent	Very Good	Good	1-5 yr
Photo-Sens. Aluminum	-50 to >1,000 3/	Excellent	Excellent	Excellent	Excellent	Over 5 yr
Metal	-50 to >1,000 3/	Good	Excellent	Excellent	Good	Over 5 yr
Ceramic	-50 to >1,000 3/	Good	Fair	Excellent	Excellent	Over 5 yr

1/ Labels suitable for application temperatures lower than 40°F shall be specified.
2/ Service life of paper and plastic labels may be improved by use of protection overlaminate. Service life shown is for harsh environment.
3/ Fasteners such as screws and rivets may also be used.

6.1.2.3 Grade considerations. In general the label grade is specified to satisfy one of the following conditions:

a) Grade A labels are intended for those applications where the labels will have to endure prolonged (longer than 2 weeks) outdoor conditions.

b) Grade B labels are intended for long term indoor applications with short term (2 weeks or less) outdoor conditions.

c) Grade C labels are intended to be used when only short term shipping or indoor conditions are expected.

d) Grade D label requirements are specified when none of the above grades will suffice. The requirements may be selected from para. 3.2.2.

6.1.2.4 Composition considerations. In general, the primary consideration is whether the label should be a paper-based or plastic-based label. Unlaminated paper labels should be considered for Grade C requirements. Laminated paper labels may be considered for Grade B requirements and provide the required abrasion protection. Laminated plastic labels should be considered for most Grade A requirements. Labels composed of materials other than paper or plastic should be considered for special applications such as marking weapons, printed circuit boards, and other end items. The type of plastic label (vinyl, polyester, polypropylene, etc.) may be specified when necessary. The thickness of photo-sensitive aluminum labels shall be specified (see 6.2) in accordance with federal spec GG-P-00455 (GSA-FSS).

6.2 Acquisition Requirements. Acquisition Document should specify the following:

a) Title, number, and date of this specification.

b) Type, grade, composition, and style that label shall conform to (see 3.1.2).

c) Laminate for protection and durability (see 3.1.2).

d) Surface(s) to which the label is to be applied for testing if different than the style specified in 6.2 (see 3.1.2).

e) Continuous or cut label stock (see 3.1.3 for Type I and II).

f) Quantity of labels per sheet or roll (see 3.1.3).

g) Thickness of label stock (see 3.1.3).

h) Message encoded in the printed symbol (see 3.1.4).

i) Code density and bar height of the bar code symbol on the label (see 3.1.4).

j) Marking technology (ex. photo composition) (see 3.1.4) (see Tables IV and V for guidance).

k) Thickness of adhesive for rough surfaces. A thickness of 2 to 5 mils depending on the roughness of the surface (see 3.1.6).

l) Application temperature if less than 40°F (see 3.1.7).

m) Length and width dimensions of the individual labels, in sheet or roll form (see 3.1.9).

n) Core diameter, width and tolerance, if otherwise specified, when labels are furnished in roll form (see 3.1.9.3).

o) Color of label or print, if different (see 3.1.10).

p) Test requirements when special requirements are necessary (see 6.1.2.1).

q) Regularly used solvents from Table VI that the label will have to withstand (see 4.6.3.2).

r) Wavelength(s) if other than 633nm required (see 3.1.4).

s) Levels of preservation and packing (see Sections 5 and 6.4).

6.3 Qualification. The attention of the suppliers is called to these requirements and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification.

Table IV. Bar Code Marking Methods vs. Label Materials

Marking Technology	Paper	Vinyl	PE 1/	PM 1/	PPP 1/	PVF	Metal	Ceramic	Photo Sens. Alum.
Direct Print	*	*	*	*	*	*	*2/	*2/	3/
Dot Matrix Impact	*	4/	4/				*2/	*2/	3/
Formed Char. Impact	*	*	*	*	*	*			3/
Ion Deposit.	*	*	*						3/
Laser Toner	*	*	*						3/
Photo Composition	*	*	*	*					*
Thermal, Direct	*								3/
Thermal Transfer	*	*	*		*	*			3/
Laser Etch							*	*	

1/ PE=Polyester; PM=Polyimide; PPP=Polypropylene; PVF=Polyvinyl fluoride.
2/ Special printer required to print metal and ceramic labels.
3/ Print technology generates master - utilizes photographic process.
4/ Normally available by special order only.
* Indicates that this label material is compatible with the indicated marking technology.

Table V. Bar Code Marking Technologies

Marking Technology	Description	Uses	Employment
Laser Etch	Marking process which employs a microprocessor controlled laser to destroy the surface molecular structure. Etched material must produce a bar code with the required PCS.	For plastics, metals or ceramics where highly durable bar code markings are required and where no contaminants are present.	Appropriate for application at manufacturing, depot, and support maintenance facilities.
Direct Print	Conventional print process involving the deposit of ink under pressure to imprint an image. Includes such print technologies as flexography, offset lithography letterpress, letterset, silkscreen and rotogravure.	To produce large quantities of high quality, identical markings or labels. May be integrated with rotary printer or another print technology to sequence or otherwise vary bar coded information. May also be employed to mark items or containers directly.	Appropriate for productiion at printing plants. Pressure sensitive tags or labels can be applied on site.
Dot Matrix Impact	Computer controlled printhead produces a series of dots in a pattern so that it forms a character. A series of solenoid driven needles strike an inked ribbon, ink is tranferred to the label stock.	Flexible, low cost production of bar coded labels, tags, or forms. Shuttle bar printer is used for line printing and serial, or moving head printer, for character printing.	Most common kind of in-house printer but also appropriate for use in a plant setting. Least desired technology for marking bar codes.
Formed Character Impact	Characters to be printed are etched on a drum over which label stock and carbon ribbon are fed. The hammer strikes when the designated character comes around on the rotating drum, forming one complete bar code character.	Production of bar coded label or tags.	Suitable for on site printing and application.

Table V. Bar Code Marking Methods - continued

Marking Technology	Description	Uses	Employment
Ion Deposition	Ions projected from a computer-controlled print cartridge form a latent image on a dielectric cylinder which is developed by adhesion of toner to the charged areas. The toner is simultaniously transferred and fixed to the printed surface under high pressure.	Production of labels and tags. Often integrated w/direct printing in a continuous web operation to add variable into such as sequentially numbered bar codes to labels printed by another process.	Appropriate for printing or computer facility but labels or tags can be applied on site.
Laser Toner	Computer controlled laser beam forms image by neutralizing charges on a charged photo-sensitive drum. A carbon toner is applied and adheres to the charges areas, developing the image which is transferred to the substrate and fixed by heat and pressure.	To produce bar coded labels, tags, and forms on cut sheet media where heat and pressure will not adversely affect label adhesives.	High speed printers are normally used in a printing or computer facility. Low speed printers are suitable for light duty use on site. Easily applied on site.
Photo Composition	Image is projected onto a photo-sensitive substrate. The substrate is then processed in the same manner as a photograph to fix the image.	To produce archival quality, bar coded labels and tags on paper, plastic, and metal substrates.	Most appropriate for offsite production by an outside vendor but can be applied on site.
Thermal Direct	Microprocessor-controlled printhead contains an array of tiny, resistive dots which provide heat necessary to cause a chemical reaction in a specially treated paper as it moves past the printhead, turning the exposed areas black.	Low cost, flexible format labels and tags. Widely used in retail sales and food industry to mark items and shelves. Indoor use only.	Simple, reliable technology appropriate for on-site printing and application. Can be used with paper labels only.

Table V. Bar Code Marking Methods -continued

Marking Technology	Description	Uses	Employment
Thermal Transfer	Similar to thermal direct but uses a thermally sensitive printing ribbon. Stylis are heated selectively, melting waxy ink onto the medium to form an image.	Combines flexibility of thermal printing with quality and durability of impact printing.	Appropriate for on-site printing. Comparable in terms of simplicity and reliability with thermal direct printing.

Table VI. Solvents

Element No.	Element	Identification
1	Trichlorotrifluorethane	MIL C-81302C Type IIA
2	Lubricant	MIL-L-46147
3	Bore Cleaner	MIL-372B (RBC)
4	Dry Cleaning Solvent	P-D-680 Type I (P-S-661)
5	Tricholorethane	Chlorinated Solvent (O-T-620)
6	Lubricating Oil (LSA)	MIL-L-46000B
7	Lubricating Oil (LAW)	MIL-L-14107B
8	Lubricating Oil (PL-S)	VV-L-800
9	Cleaner, Lubricant Preservative (CLP)	MIL-L-63460A
10	Volatile Corrosion Inhibitor (VCI)	MIL-I-8574
11	Diesel Fuel (DF-2)	VV-F-800C
12	Jet Fuel (JP-4)	MIL-T-5624L
13	Kerosene	MIL-P-25576C
14	Insect Repellant	NSN 6840-00-558-0918
15	Gasoline, Unleaded	VV-G-1690B
16	Hydraulic Fluid	MIL-H-46170
17	Antifreeze	MIL-H-46153 Type II
18	Carbon Removing Compound	P-C-111B Type II
19	Tap Water	Liquid
20	Chemical Agent Decontaminate (STB)	MIL-D-50030 (M4)
21	Chemical Agent Decontaminate (DS-2)	MIL-D-012468B
22	Miscellaneous (as required)	

6.4 Definitions.

6.4.1 Definition Criteria. For the purpose of the specification, definitions shall be as given herein. The definitions contained in this specification takes precedence over any reference document.

Backing Sheet - the material to which the label and its adhesive is attached in order to protect the adhesive prior to use.

Butt-Cut - a label with square corners which is separated from any adjacent label by only a cut through label (face stock) but not the backing sheet.

Composition - the material of which the label is made.

Characters Per Inch (CPI) - the number of bar coded characters in one inch.

Curing Time - the time required for an adhesive label to reach its optimal bond strength. Maximum curing time should not exceed 72 hours.

Die-Cut - a label with rounded corners which is separated from any adjacent label by an area where some label (face stock) has been removed leaving only backing sheet.

Discoloration - loss of contrast of the color of the label or printed symbol.

First Read Rate - expressed as a percent. The number of correct readings, while the scanner is being used in accordance with the correct operating procedures, that will be obtained by the scanner per 100 attempts.

Human Readable Interpretation (HRI) - the exact or specified interpretation of the encoded bar code data presented in a human readable font.

Grade - the durability of the bar coded label.

Laminate - a coating of material placed over the bar coded label.

Matte Finish - non-reflective, dull, or frosted in appearance.

Readability - the ability to read the bar code according to the specifications set by the first read-rate.

Roll(s) - a continuous length of backing material, wrapped around a core, to which the bar code labels are attached for shipment.

Sheet(s) - a solid piece of backing material to which the bar code labels are attached for shipment.

Special - as not adhering to a classification to either type, grade, composition, or style; therefore, requiring specific detailed description in the acquisition document.

Standard DOD Bar Code Symbology (SDS) - the 3-of-9 bar code with a Human Readable Interpretation (HRI) printed above, beside, or below the bar code.

Style - refers to the surface to which the label is to be applied.

Type - refers to the form of the label material.

6.5 Sealant Protection (optional).

6.5.1 Use of sealant. For application of an edge sealant on the bar coded label, a clear epoxy-polyamide coating (sealant) may be used. This procedure is designed for extreme environmental elements which could attack the adhesive backing on the labels. The edge sealant is strictly an option to use for label protection. This is a non-specified procedure for which the procuring agent is totally responsible.

6.5.2 Application of sealant. The clear epoxy-polyamide coating (sealant) will be applied by brush to the entire outside edge of the label, to seal the label against environmental elements. The coating is not to be applied to the bar coded label surface.

6.5.3 Ordering information. The epoxy-polyamide coating may be procured as follows:

NSN 8010-00-959-4661 (2 pints)
Type I, MIL-C-22750

Reference: GSA Catalog (J8010-Industrial)

6.5.4 Curing time. The specified curing time and conditions for the clear epoxy-polyamide coating, recommended by the manufacturer, will be used.

6.6 Surface preparation. The area of application of the bar coded label shall be clean, dry, and free of oil and grease. An evaporative solvent is generally recommended for cleaning the surface.

6.7 Bar Code Height vs. Code Density. The bar code height can vary to suit specific reading and marking requirements. The bar code height listed below should be used for corresponding ranges of bar code density. For those applications where these heights are not suitable, height requirements will be as specified by the procuring activity.

Density Range (Characters per inch)	Minimum Height in	Minimum Height (mm)	Maximum Height in	Maximum Height (mm)
$1.7 \leq CPI < 3.0$	0.75	(19.05)	1.25	(31.75)
$3.0 \leq CPI < 6.5$	0.375	(9.53)	0.985	(22.23)
$6.5 \leq CPI \leq 9.4$	0.25	(6.35)	0.50	(12.7)
$9.4 \leq cpi \leq 12.5$	0.125	(3.18)	0.375	(9.53)
$12.5 < CPI \leq 15.5$	0.0625	(1.59)	0.250	(6.35)

6.8 Abraser. The Teledyne-Taber Model 503, standard abrasion tester with accessories, manufactured by Teledyne-Taber, North Tonawanda, NY 14120, meets the requirements of this specification.

6.9 Print contrast meter. The MacBeth PCM II print contrast meter, manufactured by MacBeth, Kollmorgen Corporation, Little Britain Road, Newburgh, NY 12550, meets the requirements of this specification.

6.10 Detergent powder. Alconox is a registered trademark of Alconox, Inc., New York, NY 10003.

6.11 Application examples. Extreme environmental considerations may lead to degradation of the label, adhesive, and laminate. This degradation may affect the bar reflectance, space reflectance, reflectivity difference, and element uniformity of the label. The net effect of degradation will be a reduction in the conformance level of a symbol and may even lead to a symbol being unreadable. Following is a list of application areas affected by these factors, environmental factors of concern, and recommended user actions which may be appropriate.

Application Examples	Environmental Factor	Recommended Action
Outside Marking Receiving Docks Refrigerated Areas PC Board Processing Engine Areas	Temperature	Specify temperature requirement
High Humidity Areas Warehouses	Humidity	Specify humidity requirement or test requirement
Marine Application	Salt Spray	Specify test
Outdoor Storage	Solar Radiation	Specify test
Shipping	Abrasion	Specify test
Miscellaneous	Chemicals	Specify chemicals label will be subjected to

Application Examples	Environmental Factor	Recommended Action
Hospitals Machine Shops Ultrasonic Cleaners	Solvents, Cleaners	Specify solvents and cleaners the label will be subjected to
Lubricated Materials	Lubricants	Specify
Tropics	Fungi Resistant	Specify antifungal treatment

6.11 Conditions for use of level B preservation. When level B preservation is specified (see 5.1), this level of protection should be used for the acquisition of labels for resupply worldwide under known favorable handling, transportation, and storage conditions.

6.12 Subject term (key word) listing.

acrylic
durability
laminate
LOGMARS
markings
mylar
photo-image
photo-sensitive
polyester
polyimide
polypropylene (PPL)
polyvinylfluoride (PVF)
symbology
thermal
thermal transfer
trichloroethane
vinyl

Custodians:

Army - SM
Navy - SA
Air Force - 43
Marine Corps - MC (LLP-2)
DLA - DH (DLA-CWP)

Preparing activity:

Army - SM

(Project 7690-0069)

Review activities:

Army - CR, AL, AR, AT ME, AV, MD, ER, MI, GL, LM, AM, MR, MT, TM, AM
Navy - YD, MC, SH, AS, OS, MS, EC, CG, JH
Air Force - 11, 99, 01, 69, 70, 71, 80, 82, 84
DLA - CT, SC, DM, ES, GS, IS, PS, ES, IP, SSA
Federal - GSA
DOD - PO, DLSSO

User activities:

DLA - IP, SS,
Army - MT