MIL-I-43295A(GL)
16 October 1968
SUPERSEDING
MIL-I-43295(GL)
2 December 1964

MILITARY SPECIFICATION

INK, MARKING, VINYL

1. SCOPE

* 1.1 This specification covers one type of stencil ink for marking vinyl coated nylon cloth (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

H-B-621	-	Brush, Stencil.
O-E-760	-	Ethyl Alcohol, (Ethanol); Denatured Alcohol: and Proprietary Solvent.
P-D-680	-	Dry Cleaning Solvent.
UU-S-625	-	Stencilboard.

MILITARY

MIL-C-20696	-	Cloth, Coated Nylon, Waterproof.

STANDARDS

FEDERAL

Fed. Test Method Std. No. 141	-	Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling and Testing.

FSC 7510

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.

(Copies of specifications and standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

* 3.1 Material.- The marking ink shall be a stable, homogenous, liquid, compounded of suitable resins, pigments, modifiers, and solvents.

* 3.1.1 Prohibited material.- The ink shall contain no benzol (benzene), aniline or chlorinated solvents.

3.2 Color.- Unless otherwise specified, the color of the ink shall be black.

3.3 Condition in container.- A freshly opened full container of the ink shall show no hard settling. Any settling shall mix readily to a smooth consistency by stirring or shaking. The ink shall show no curdling, livering or caking, and shall be free from lumps and skins.

3.4 Viscosity.- When tested as specified in 4.3.6, the viscosity of the ink shall be 75 to 90 seconds at 77°F. (25° C.).

* 3.5 Vehicle solids.- When tested as specified in 4.3.6, the vehicle solids shall be not less than 14.0 percent.

3.6 Accelerated storage.- After 21 days at 100° ± 5°F., the ink in a closed, filled container shall show no skinning, caking, livering, and curdling or color separation. Any settling shall be dispersible by manual stirring.

3.7 Performance.-

3.7.1 Marking characteristics.- When tested as specified in 4.3.6, the ink shall be suitable for direct application to vinyl coated nylon fabrics and shall produce uniform, opaque, sharp, and legible impressions. The ink shall not strike through the fabric.

* 3.7.2 Drying time.- The ink shall be non-tacky to the touch after drying for 2 minutes and shall be completely dry within 2 hours when tested as specified in 4.3.6.

* 3.7.3 Adhesion.- The ink lettering shall remain legible (all the letters shall be distinct and complete in every detail) after being abraded with steel wool as specified in 4.3.6.

3.7.4 Water resistance.- There shall be no running, spreading, smearing, cracking, flaking or separating of the ink when impressions on vinyl coated nylon fabrics are soaked in water when tested as specified in 4.3.6.

3.7.5 Solvent resistance.- There shall be no softening or dulling of the ink when impressions are treated with solvents as specified in 4.3.6.

* 3.7.6 Blocking and migration.- There shall be no transferring of the ink from the coated fabrics or migration in the coated fabric when tested as specified in 4.3.7.

3.7.7 Flexibility.- There shall be no cracking, flaking or separating of the ink from the fabric when tested as specified in 4.3.6.

3.7.8 Low temperature flexibility.- There shall be no cracking, flaking or separating of the ink from the fabric when tested as specified in 4.3.6.

* 3.8 Labeling.- In addition to the markings specified in 5.3, each unit container shall be legibly and durably marked with the following information:

INK, MARKING, VINYL
DIRECTIONS FOR USE

1. Apply ink, as is, on vinyl coated nylon by means of a stencil brush.

2. Using a circular motion of the brush, apply a minimum amount of ink to obtain sharp legible letters.

Note: In addition, each container shall be legibly marked with the names of solvents for use in thinning the ink to stencilling or spraying consistency.

3.9 Workmanship.- The ink shall be a homogenous liquid, uniform in appearance.

4. QUALITY ASSURANCE PROVISIONS

* 4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

* 4.1.1 Certificate of compliance.- Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

* 4.2 Inspection.- Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter.

* 4.2.1 Inspection of components and materials.- In accordance with 4.1 above, components and materials shall be inspected and tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified or qualified in this specification or applicable purchase document.

4.3 Inspection of the end item.-

4.3.1 Examination of the end item.- The end item shall be examined for the defects in the applicable sub-paragraphs at the inspection levels and acceptable quality levels (AQLs) set forth in 4.3.5. Random samples shall be drawn from each lot of end items offered for inspection. The lot size for purpose of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of filled containers of the specified capacity for examination in 4.3.2, 4.3.3 and 4.3.4.

4.3.2 Examination of the unit container for visual defects in construction and markings.-

Examine	Defect
Construction	Any leakage of contents. Any split, break, dent, hole, puncture.

Examine	Defect
Markings (label or printing)	Omitted, illegible, incorrect, incomplete, not in accordance with requirements.
	Label or printing not clear, smeared, ink not as specified.

4.3.3 Examination for defects in net contents.- The sample unit for this examination shall be one filled unit container. The lot shall be unacceptable if the average net contents per container is less than the specified or indicated quantity.

4.3.4 Examination of marking ink for defects in workmanship.- The sample unit for this examination shall be the contents of one filled unit container.

Examine	Defect
Workmanship	Not in liquid form, not homogenous. Not clean; not uniform, contains foreign matter. Contains lumps, skins, hard settling livering. Any curdling or caking.
Color	Not black or as specified.

4.3.5 Inspection levels and acceptable quality levels (AQLs) for examinations.- The inspection levels, for determining the sample size, and the acceptable quality levels (AQLs), expressed in defects per 100 units, shall be as follows:

Examination paragraph	Inspection level	AQLs
4.3.2	I	1.5
4.3.3	S-2	NA
4.3.4	S-2	1.5

* 4.3.6 Testing of the end item.- The methods of test specified in Fed. Test Method Std. No. 141 wherever applicable and as listed in table I shall be followed. The sample unit for testing shall be one pint of ink. The lot size shall be expressed in pints. The sample size shall be as shown in the table below. The lot shall be unacceptable if one or more sample units fail to meet any test requirements specified.

Lot size (pints)	Sample size
800 or less	2
801 to 22,000	3
22,001 or more	5

INSTRUCTIONS FOR TESTING THE END ITEM

TABLE I

CHARACTERISTIC	Specification Reference		Requirements Applicable To		Number Determinations	Results Reported As		Inspect Level	AQL
	Requirement	Test Method	Sample Unit		per Sample Unit	Pass or Fail	Numerically to Nearest		
Prohibited material	3.1.1	1/							
Viscosity (For Cup No. 4)	3.4	4282 2/		X	Average of 2	X	second		
Vehicle solids	3.5	4051 2/		X	Average of 2	X	0.1 percent		
Accelerated storage	3.6	4142 2/		X	1				
Performance:									
Marking characteristics	3.7.1	4.4.3.1		X	1				
Drying time	3.7.2	4.4.3.2		X	1				
Adhesion	3.7.3	4.4.3.3		X	1				
Water resistance	3.7.4	4.4.3.4		X	1				
Solvent resistance	3.7.5	4.4.3.5		X	1				
Blocking and migration	3.7.6	4.4.3.6		X	1				
Flexibility	3.7.7	4.4.3.7		X	1				
Low Temperature flexibility	3.7.8	4.4.3.8		X	1				

1/ Unless otherwise specified, a certificate of compliance is required and will be acceptable for the requirement stated.

2/ Fed. Test Method Std. No. 141.

4.4 Test procedures.

4.4.1 Test conditions.- Unless otherwise specified, all ink impressions shall be made, dried and tested at 73.5° ± 3.5°F. and at 50 ± 2 percent relative humidity.

4.4.2 Standard fabrics.- All impressions shall be made on standard test fabrics conforming to class 2 of MIL-C-20696 (see 6.3).

4.4.3 Performance.- All tests shall be conducted using unthinned ink applied with a stencil brush conforming to H-B-621. The stencilboard shall conform to UU-S-625.

4.4.3.1 Marking characteristics.- Stencil the five capital letters, A, B, C, D and E, approximately 3/4-inch high on a 5-by 8-inch piece of the vinyl coated nylon test fabric. Use a circular motion of the brush and apply a minimum amount of ink to obtain sharp, opaque, legible letters without blurring of the edges or smearing under the stencilboard. The test shall fail if clear lettering cannot be obtained.

* 4.4.3.2 Drying time.- Stencil five letters on test fabric as specified in 4.4.3.1. After 2 minutes, examine for set-to-touch by lightly touching the inked letters with the fingers. Allow the ink to dry 2 hours and then rub the lettering with light finger pressure. Any smearing will constitute failure of this test.

* 4.4.3.3 Adhesion.- The test specimen shall be prepared as specified in 4.4.3.1, except the test fabric shall be 5 inches by 20 inches, and the lettering shall be equidistant from the edges of the test fabric with the row of letters not longer than 5 inches. Allow the lettering to dry for two hours, then using an arrangement similar to that shown in figure 1, place a new full pad (approximately 4 by 4 inches) of Number 0000 steel wool on the test specimen just ahead of the lettering. A 4-by 4-inch square of 1/4-inch plywood or sheet plastic shall be centered on the steel wool pad and a 5000-gram weight shall be centered on the square. The test specimen shall be drawn at a rate of approximately 1/2-inch per second, under and away from the weighted steel wool pad. The test specimen shall be placed in the original position, except the direction of draw shall be in the opposite direction. Alternating the direction of draw, repeat the procedure for a total of 10 draws. After the tenth draw, the lettering shall be examined for legibility.

4.4.3.4 Water resistance.- Prepare samples as specified in 4.4.3.1 and allow the ink to dry for two hours. Soak the specimens in water at test temperature for 24 hours. Remove the fabric from the water and immediately fold and crease the specimen forward and backward across the inked portion for ten cycles with moderate finger pressure. Examine the lettering for spreading, smearing, running, cracking, flaking or separation.

4.4.3.5 Solvent resistance.- Two samples of the fabric shall be prepared as specified in 4.4.3.1 and allowed to dry for two hours. Immerse one specimen in 200 ml. of drycleaning solvent conforming to type I of P-D-680 (Stoddard Solvent) and the other specimen in 200 ml. of 95 percent (by volume) ethyl alcohol conforming to grade I, class B of O-E-760. Immerse for one minute. Remove the specimens from the solvents and examine the ink impressions for softening and dulling.

* 4.4.3.6 Blocking and migration.- Prepare a two-inch square area of the test fabric as specified in 4.4.3.1 and allow to dry for two hours. Place the test fabric, inked side down, on a piece of test fabric which has not been inked and apply a 4-pound weight to the two-inch square test area. Subject the sample to a temperature of 160° ± 5°F. for 16 hours. Remove the 4-pound weight and allow the specimen to cool to room temperature. Separate the surfaces. Examine the lettering for migration of ink into the coating adjacent to the lettering and the uninked surface for ink transfer.

4.4.3.7 Flexibility.- Prepare a two-inch square area of the test fabric as specified in 4.4.3.1 on fabric approximately 4 by 4 inches. Air dry for 16 hours. Fold the fabric across the center of the lettering and apply pressure along the fold with a steel roller approximately 5-1/2 inches in diameter, 2 inches wide and with a suitable guide handle. The weight of the roller shall be approximately 10 pounds. Refold the fabric in the reverse direction, and crease with the roller. Repeat for 10 cycles. Examine the ink lettering for cracking, flaking or separation from the fabric surface.

4.4.3.8 Low temperature flexibility.- Mark a two-inch square area in the center of a 4-inch square test fabric prepared as specified in 4.4.3.1. Allow to dry for 16 hours. Expose the fabric to a temperature of 0° to 5°F. for 4 hours. Without removing from the cold chamber, quickly bend the specimen, with the marked side out, through an angle of 180 degrees over a 1/2 inch rod. Examine the ink for cracking, flaking or separation from the fabric.

5. PREPARATION FOR DELIVERY

5.1 Packaging.- Packaging shall be level C.

* 5.1.1 Level C.- Ink shall be packaged to afford adequate protection against deterioration and physical damage during shipment from the supply source to the first receiving activity. The supplier may use his standard practice when it meets this requirement.

5.2 Packing.- Packing shall be level C.

5.2.1 Level C.- Ink, packaged as specified in 5.1, shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. Containers shall be in accordance with rules or regulations of carriers applicable to the mode of transportation.

5.3 Marking.- In addition to any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

* 6.1 Intended use.- The ink covered by this specification is intended for the stencil marking of vinyl coated nylon fabrics at posts, camps, and stations.

6.2 Ordering data.- Procurement documents should specify the following:

a. Title, number and date of this specification.
b. Color desired, if other than black (see 3.2).

6.3 Standard samples.- Samples of vinyl coated nylon fabric for testing purposes may be obtained from the U. S. Army Natick Laboratories, Natick, Massachusetts.

* 6.4 The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodian:

Army - GL

Review activities:

Army - GL, MD, MU

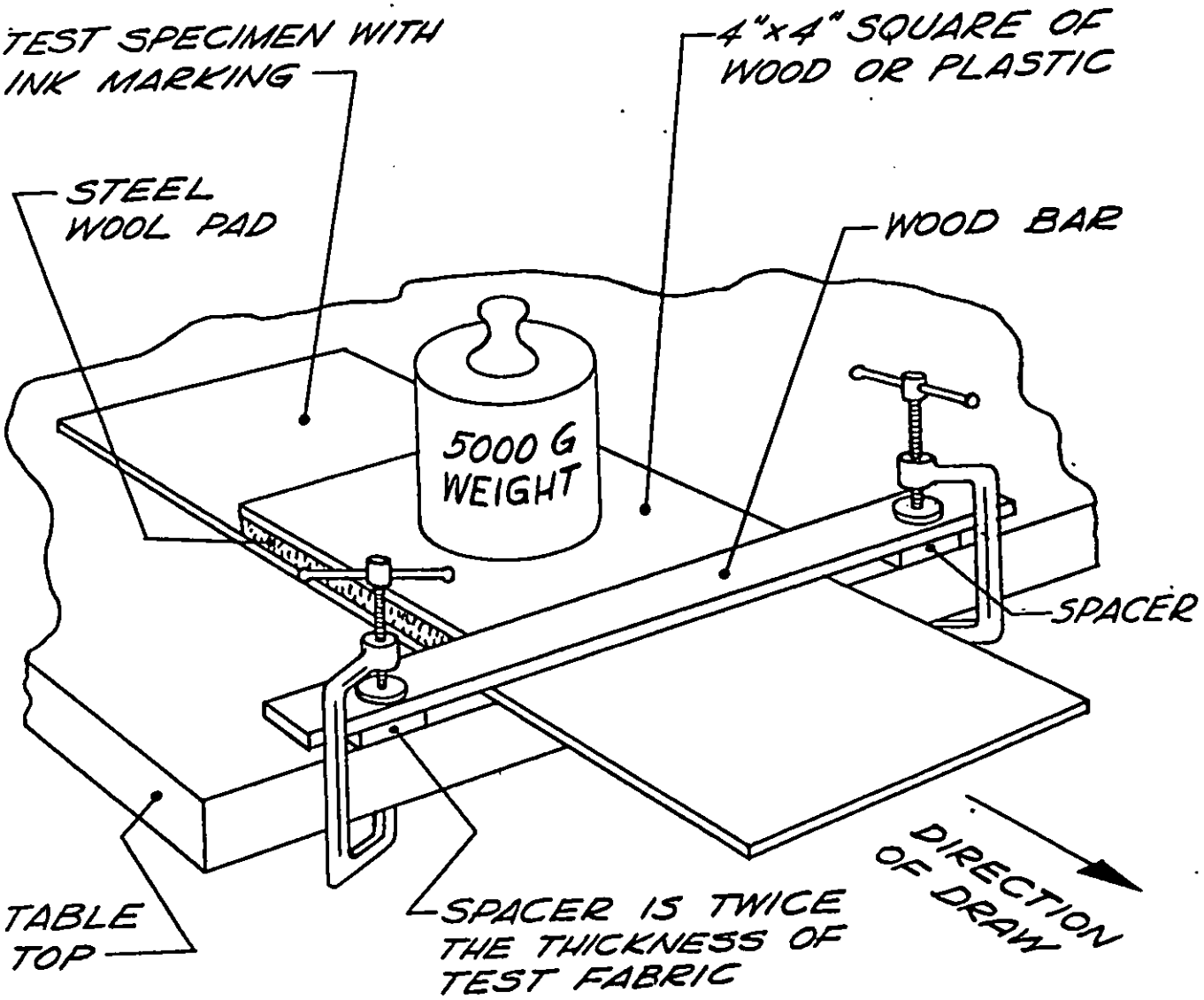
User activities:

Army - MI, SM

Preparing activity:

Army - GL

Project Number 7510-A205



NOTE:
THIS DEVICE PERMITS THE FABRIC TEST SPECIMEN TO BE DRAWN ACROSS THE STEEL WOOL PAD WHILE THE STEEL WOOL IS HELD IN A STATIONARY POSITION

FIG. 1 STEEL WOOL ABRASION TEST