

MMM-A-137D
August 4, 1976
SUPERSEDING
Fed. Spec. MMM-A-137C
July 2, 1965
(see 6.3)

FEDERAL SPECIFICATION

ADHESIVE, RESILIENT FLOORING (WATER SOLUBLE)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers two classes of adhesive for securing resilient flooring to above grade floors.

1.2 Classification. The adhesive covered by this specification shall be of the following classes, as specified (see 6.2):

- Class 1 - High viscosity for trowel application.
- Class 2 - Low viscosity for spray application.

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

- L-F-475 - Floor Covering vinyl, Surface (Tile and Roll), with Backing.
- L-F-001641 - Floor Covering Translucent or Transparent, Vinyl Surface with Backing.
- TT-E-485 - Enamel, Semi-Gloss, Rust Inhibiting.
- LLL-F-1238 - Floor Covering, Linoleum.
- PPP-C-96 - Cans, Metal 28 Gage and Lighter.
- PPP-D-729 - Drums; Metal, 55-Gallon (For Shipment of Noncorrosive Material).
- PPP-P-704 - Pails; Shipping, Steel (1 through 12 Gallon).

Federal Standard:

- Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing office, Washington, DC 20402.)

(Single copies of this specification and other Federal Specifications

required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.)

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

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Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military 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.)

2.2 Other Publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Motor Freight Traffic Association, Inc., Agent:

National motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 Material. The adhesive shall consist of a binder in a water-base suspension, intimately mixed with inorganic filler and other desirable additives to control odor and prohibit mold growth. It shall be free of all substances which may affect the serviceability or have a deleterious effect on resilient flooring or underlayment materials.

3.2 Uniformity. When tested as specified in 4.4.1, the adhesive shall be homogeneous, shall not show filler ingredient stratification or settling, and shall be free of lumps or foreign particles.

3.3 Alkalinity. When tested as specified in 4.4.2, the adhesive shall not give an alkaline reaction.

3.4 Viscosity. When tested as specified in 4.4.3, the viscosity of the adhesive shall be as follows:

	Viscosity (centipoises)	
	Minimum	Maximum
Class 1	80,000	250,000
Class 2	40,000	120,000

3.5 Bonding strength. When tested as specified in 4.4.4, the adhesive shall have average bonding strength of not less than 4 pounds.

3.6 Adhesion. When tested as specified in 4.4.5, the adhesive shall adhere satisfactorily to the back side of the flooring specified.

3.7 Shelf storage life (see 4.1.1). When stored as specified in 4.4.6, the adhesive shall meet the requirements of 3.2 and 3.5, the bonding strength shall be not less than 3.6 pounds, and the viscosity shall be as follows:

	Viscosity (centipoises)	
	<u>Minimum</u>	<u>Maximum</u>
Class 1	72,000	275,000
Class 2	32,000	132,000

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 that supplies and services conform to prescribed requirements.

4.1.1 The supplier shall submit to the contracting officer a certificate of compliance with the shelf storage life requirements in 3.7. When certificates of compliance are submitted, the Government reserves the right to test such items to determine the validity of the certificate.

4.2 Sampling.

4.2.1 Lot. For the purposes of sampling, a lot of the adhesive shall consist of a manufacturer's batch. A batch is defined as the end product of all raw materials mixed, blended, or processed in a single operation.

4.2.2 Sampling for inspection of filled containers. A random sample of filled containers shall be selected in accordance with MIL-STD-105 at inspection level I and acceptable quality level (AQL) = 2.5 percent defective to verify compliance with this specification regarding fill, closure, and marking and other requirements not involving tests.

4.3 Inspection.

4.3.1 Inspection of containers. Each sample filled container shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each filled container shall also be gaged to determine the amount of contents. Any container in the sample having one or more defects or under required fill shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, the lot represented by the sample shall be rejected.

4.3.2 Inspection of preparation for delivery. An inspection shall be made to determine that the packaging, packing, and marking comply with the requirements of section 5 of this specification. Defects shall be scored in accordance with table I. For examination of interior packaging, the sample unit shall be one shipping container fully prepared for delivery selected at random just prior to closing operations. Sampling shall be in accordance with MIL-STD-105. Defects of closure listed shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 and the AQL shall be 4.0 defects per hundred units.

TABLE I. Classification of preparation for delivery defects

Examine	Defects
Markings (exterior and interior)	Omitted; improper size, location, sequence, or method of application.

Materials

Any component missing or damaged.

Workmanship

Inadequate application of components such as incomplete closure of container flaps, loose strapping, inadequate stapling. Bulging or distortion of container.

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4.3.3 Testing of the end item. The methods of testing specified in 4.4 shall be followed. For purposes of sampling, the lot shall be expressed in units of gallons of adhesive. The sample unit for testing shall be 1 quart of adhesive, randomly selected from containers in the lot. The adhesive shall be placed in separate, clean, dry metal or glass containers, sealed, marked and forwarded to the testing laboratories. The sample size shall be as follows:

<u>Lot size (gallons)</u>	<u>Sample size</u>
800 or less	2
801 up to and including 22,000	3
22,001 and more	5

Tests shall be performed on a sample unit basis. All test reports shall contain the individual values utilized in expressing the final result. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified.

4.4 Test procedures.

4.4.1 Uniformity. The sample selected in accordance with 4.3.3 shall be stored for at least 1 week at a temperature of not less than 21 deg. C (70 deg. F) and shall not be subjected to vibration, tumbling, or stirring during storage nor prior to examination. Three-fourths of the contents of the container shall be transferred to an empty container, and the remaining adhesive examined for settling of the filler. The entire sample shall then be thoroughly mixed, and a portion not less than 10 g shall be spread in a thin layer on a glass plate and examined for lumps and foreign materials to determine conformance with 3.2.

4.4.2 Alkalinity. A layer of well-stirred adhesive shall be spread on a clean glass slide, glass plate, or other suitable clean neutral surface. Strips of red litmus indicator paper, moistened with distilled water, shall be laid flat on the layer of adhesive. Any development of blue color in the indicator paper, within 30 seconds, indicates the presence of alkali in the adhesive.

If the color change of the indicator paper is questionable, or in the case of referee tests, this test shall be performed with a pH meter, equipped with a glass electrode, and capable of making measurements to ± 0.05 pH unit, according to the following procedure. A sample of adhesive containing 2 g of solids shall be dispersed in 10 ml of distilled water. The pH of the distilled water shall be between 5.6 and 7.0. The temperature of the water, at the time of dispersion, and throughout the period of test, shall be 23 ± 1 deg. C (73 ± 2 deg. F). The pH shall be measured after 15 minutes, and then every 24 hours until the value is constant within 0.05 pH unit. Except when measurements are being made, the samples shall be kept in tightly stoppered glass containers, which do not exhibit an acid or alkaline reaction. At least three samples shall be tested. If the average pH of the three samples is 7.50 or greater, alkali shall be considered present. Presence of alkalinity determined by either of the above methods shall constitute nonconformance with 3.3.

4.4.3 Viscosity.

4.4.3.1 Apparatus. Use a Brookfield Synchroelectric viscometer, Model RVF, or equivalent, with a No. 7 spindle, operated at 10 r.p.m.

4.4.3.2 Procedure. Stir the adhesive until it is uniform (see 3.2 and 4.4.1). Put a minimum of 800 ml of the uniform adhesive in a wide-mouth metal container which can be tightly closed. Condition the closed sample to the constant temperature of 25 ± 1 deg. C (77 ± 2 deg. F). Stir the conditioned sample for 130 seconds, and insert the spindle up to the depth mark. Start the viscometer and after 2 minutes read the 100 scale. Convert the scale reading to centipoises by reference to a calibration curve or conversion table, to determine conformance with 3.4.

4.4.4 Bonding strength.

4.4.4.1 Test specimens (adherends). The procedure specified in 4.4.4.2 shall be followed with the following adherends and equipment;

- (a) No. 1 white pine board, 9 cm by 15 cm by 1 cm (2-3/4 inches by 6 inches by 3/8-inch).
- (b) The following floorings, each specimen measuring 5 cm by 30 cm (2 inches by 12 inches):
 - (1) Type I or II, grade A, of L-F-475.
 - (2) Type I, class 1, of L-F-001641.
 - (3) Type III, class 1, of L-F-001641.
 - (4) Type I, class 1, grade B, of LLL-P-1238.
 - (5) Type I, class 2, grade A, of LLL-P-1238.
- (c) A steel trowel with notches 15.9 cm (1/16-inch) deep, 15.9 cm (1/16-inch) wide, and spaced 23.8 cm (3/32-inch) apart. (Note: The trowel is suitable for spreading both class 1 and class 2 adhesive. Dimensions and placement of notches may vary slightly so long as the adhesive may be spread by the trowel in a uniform manner.)
- (d) A pulling device (preferably with a recorder) for separating the bonded specimens.

4.4.4.2 Procedure. Condition 500 ml of the adhesive for 16 +/- 1 hours at less than -12 deg. C (10 deg. F). Remove the adhesive from the conditioning medium, and allow its temperature to rise naturally to 21 to 32 deg. C (70 to 90 deg. F). Maintain the adhesive at this temperature range during bonding. Apply 5.5 +/- 0.2 grams of the adhesive to the pine board and, using the trowel, spread it uniformly over one side of the board surface. With its back to the adhesive, bond the flooring specimen to the pine board. Have one end of the flooring flush with the end of the board. Have the other end of the flooring extended 15 cm (6 inches) over the end of the board. Apply a weight of 10 pounds uniformly over the bonded area and, with this weight applied, allow the bond to dry for 72 to 120 hours at 21 to 24 deg. C (70 to 75 deg. F) and 50 +/- 4 percent relative humidity. When dried, break the bond for at least 2.5 cm (1 inch) by pulling free the 15 cm (6 inch) end of the flooring extending beyond the end of the board. Place the assembled specimen in the jig, shown in figure 1, which has been secured in the fixed jaw of the pulling device, and then insert the stripped portion of the flooring into the movable jaw of the pulling device. The flooring is stripped from the board at the rate of 30.5 +/- 5.1 cm (12 +/- 2 inches) per minute by steadily pulling the flooring at approximately right angles to the board. The temperature during the test shall be between 21 and 24 deg. C (70 and 75 deg. F). When the pulling device is equipped with a recorder, the bond strength for each specimen is obtained by measuring the value at the midpoint on the full length of the curve and the values at two additional points, on each side of the midpoint, which correspond to linear distances on the specimen, of 1.3 and 2.5 cm (1/2 and 1 inch) from the point on the specimen represented by the midpoint on the curve. The five values representing a 5.1 cm (2 inch) portion of the specimen shall be averaged, and reported as the bond strength of the specimen. If the pulling device is not provided with a recorder, the bond strength of each specimen is determined by observing the average pull in kilograms (pounds) from the dial indicator during the stripping of the middle 5.1 cm (2 inch) portion of the specimen. Five specimens of each type of flooring shall be tested in this manner, and the individual results obtained shall be averaged and reported as the bonding strength. A testing machine equipped with a recorder shall be used in the

event of any conflict. The flooring shall be considered to meet the requirements in 3.5, if its backing delaminates, splits, or breaks during the test, even if the load has not reached the specified 4 pounds.

4.4.5 Adhesion. The well-stirred adhesive (6.0 +/- 0.2 g) shall be applied smoothly uniformly to the back of 7.6 cm by 15.2 cm (3 inch by 6 inch) pieces of flooring materials specified in 4.4.4.1. The adhesive film shall be allowed to dry for at least 16 hours at a temperature of 21 to 24 deg. C (70 to 90 deg. F). The film shall then be dried in an oven for 6 +/- 1/4 hours at a temperature of 79 +/- 2 deg. C (175 +/- 5 deg. F). After

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removal from the oven, the specimen shall be conditioned for at least 24 hours at a relative humidity of 50 +/- 4 percent and a temperature of 23 +/- 1 deg. C (74 +/- 2 deg. F) prior to testing at this temperature. The sample shall be beat face up around a mandrel 12.7 cm (5 inches) in diameter and then in the opposite direction, adhesive side up. Note any separation of adhesive from the back of the flooring, while still under tension over the mandrel, the adhesive shall be examined for separation from the back of the flooring, and the entire surface of the adhesive film shall then be scraped with the edge of a spatula or knife. Any separation of the adhesive, or tendency to fly away or be cleanly removed from the flooring by scraping, shall be cause for rejection, as not conforming to 3.6.

NOTE: Cracking of the adhesive film may occur during this test but such cracking shall not be cause for rejection.

4.4.6 Shelf storage life. In a 1-pint glass jar with a i!lose fitting top, store a pint o the adhesive for 1 year from date of manufacture, in a relatively undisturbed condition at 25 +/- 1 deg. C (77 +/- 2 deg. F). Test for compliance with 3.7 (see 4.1.1).

5. PREPARATION FOR DELIVERY

5.1 Packaging. The adhesive shall be packaged level A, B, or C, as specified in the contract or order (see 6.2).

5.1.1 Level A.

5.1.1.1 One-gallon cans. Quantities of 1 gallon of adhesive shall be packaged in cans conforming to type V, class 2 of PPP-C-96. Exterior plan B coating and side seam stripping shall be required. Containers shall be provided with wire handles or bails which shall be galvanized or protectively coated to resist corrosion.

5.1.1.2 Five-gallon pails. Pails containing 5 gallons of adhesive shall conform to type II or type III, class 3 of PPP-P-704. Exterior coating of pails shall be required and shall conform to TT-E-485. Wire handles or bails shall be required. Wire handles or bails shall be galvanized or protectively coated to resist corrosion.

5.1.1.3 Fifty-five gallon drum. Drums containing 55 gallons of adhesive shall conform to type III of PPP-D-729. Drums shall be exterior coated with enamel conforming to TT-E-485.

5.1.2 Level B.

5.1.2.1 One-gallon containers. One gallon quantity of adhesive shall be packaged in round metal cans conforming to type V, class 2 of PPP-C-96. The cans shall have exterior coating plan A.

5.1.2.2 Five-gallon pails and 55-gallon drums. Five-gallon pails and 55-gallon drums shall be furnished as specified in 5.1.1.2 and 5.1.1.3, respectively.

5.1.3 Level C. Adhesive in the quantities an specified (see 6.2) shall be packaged in accordance with the manufacturer's commercial practice.

5.2 Packing.

5.2.1 Levels A and B.

5.2.1.1 Cans. Adhesive furnished in quantities of 1 gallon shall be packed in accordance with the appendix of PPP-C-96.

5.2.1.2 Drums or pails. Adhesive furnished in 5-gallon pails or 55-gallon drums shall require no additional packing.

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5.2.2 Level C. Adhesive packaged as specified (see 6.2) shall be packed in containers which will ensure acceptance by carrier and safe delivery at destination. Containers and packing comply with the Uniform Freight Classification rules or National Motor Freight Classification rules.

5.3 Marking. Marking shall be in accordance with 5.3.1 or 5.3.2, and 5.3.3 as specified (see 6.2).

5.3.1 Civil agencies. The packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military agencies. The packages and shipping containers shall be marked in accordance with MIL-STD-129.

5.3.3 Special marking. In addition to markings specified in 5.3.1 or 5.3.2 as applicable, information shall appear on each unit container and shipping container as follows:

- (a) Manufacturers instructions for storage and use (to include thinning directions if applicable).
- (b) Date of manufacture (by month and year, not in code).
- (c) Date of first reinspection (date one year from date of manufacture).

6. NOTES

6.1 Intended use. This adhesive is intended for the installation of opaque or translucent vinyl surface floor coverings with backing, linoleum, and other resilient floorings. (Refer to the manufacturer's recommendations supplied with his product for additional information on special installations.) It is not recommended for installation of coverings on steel or other metal subfloors.

6.2 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Class of adhesive required (see 1.2).
- (c) Size and type of container required (see 5.1).
- (d) Quantity required.
- (e) Level of packaging and packing required (see 5.1 and 5.2).
- (f) Special marking required (see 5.3).

6.3 Supersession data. Class 1 of this specification supersedes MMM-A-137C. class 2 of this specification did not appear in MMM-A-137C.

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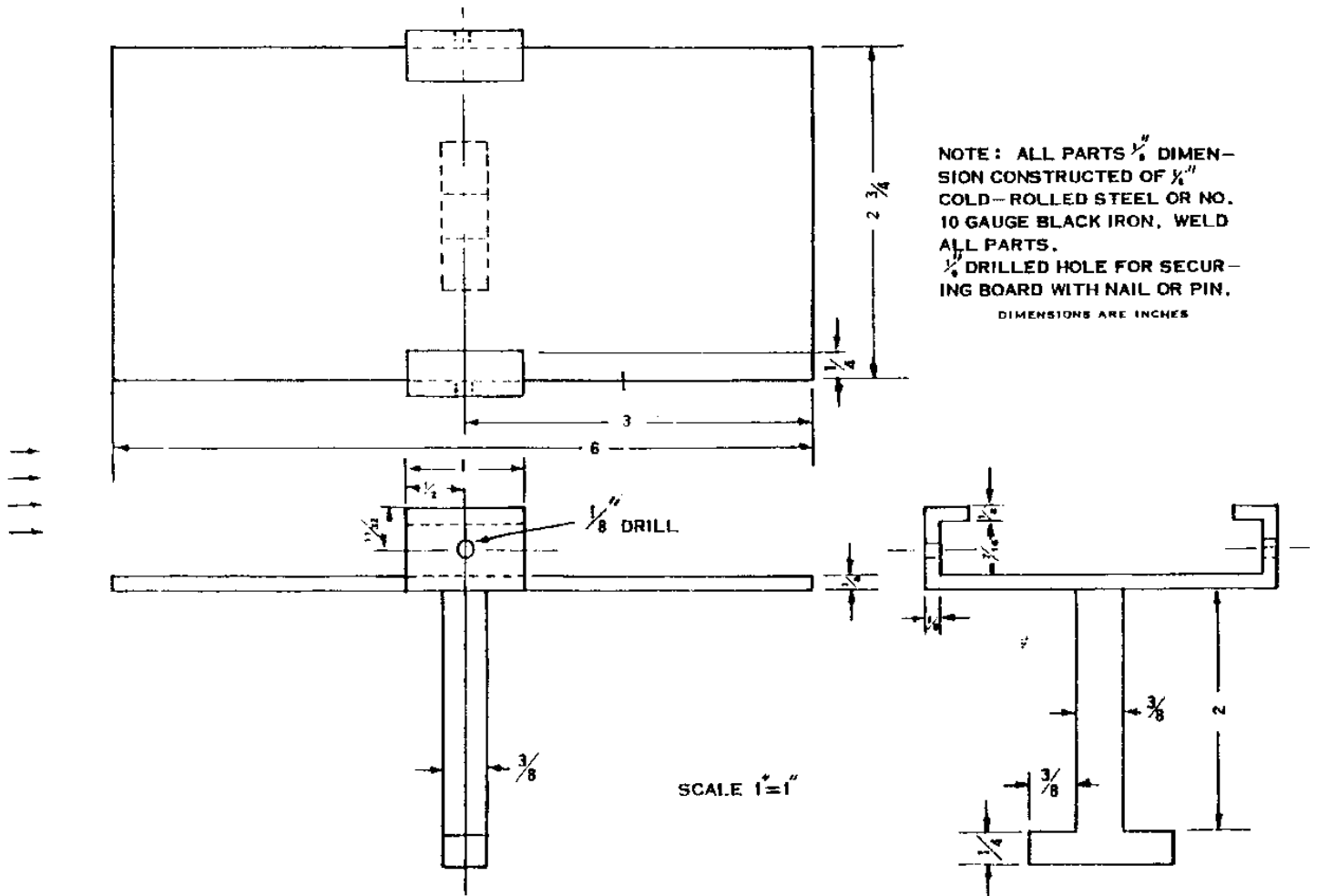


FIGURE 1. FLOOR COVERING STRIPPING JIG

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MILITARY CUSTODIANS:

Army - MR
Navy - YD

CIVIL AGENCY COORDINATING ACTIVITIES:

COM - NBS
GSA - PCD

Review activity:

Navy - YD

PREPARING ACTIVITY: GSA - FSS

User activity:

Navy - YD

Orders for this publication are to be placed with General Services Administration, acting as ar. agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 35 cents each.

NOTICE OF
VALIDATION

MMM-A-137D
NOTICE 1
10 February 1987

TITLE: Adhesive, Resilient Flooring (Water Soluble)

MMM-A-137D has been reviewed and determined to be valid for use in acquisition.

Custodians:

Army - MR
Navy - YD
Air Force - 99

Preparing activity:

Army - MR

AMSC N/A

FSC 8040

DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited.