

MIL-A-24179A(SHIPS)  
15 May 1969  
SUPERSEDING  
MIL-A-24179(SHIPS)  
19 October 1965  
(see 6.5)

## MILITARY SPECIFICATION

### ADHESIVE, FLEXIBLE UNICELLULAR-PLASTIC THERMAL INSULATION

#### 1. SCOPE

1.1 Scope. This specification covers high initial strength, heat and water resistant, contact type adhesives for bonding flexible unicellular-plastic thermal insulation to itself and to metal surfaces.

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

Type I - Dispersed in water.  
Type II - Dispersed in non-halogenated organic solvent.  
Class 1 - Low Flash Point.  
Class 2 - Intermediate Flash Point.  
Type III - Dispersed in non-flammable organic solvent.

#### 2. APPLICABLE DOCUMENTS

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

#### SPECIFICATIONS

##### FEDERAL

TT-P-645 - Primer, Paint, Zinc-Chromate, Alkyd Type.

##### MILITARY

MIL-P-15280 - Plastic Material, Unicellular (Sheets and Tubes).

#### STANDARDS

##### FEDERAL

FED-STD-141 - Paint, Varnish, Lacquer, and Related Materials: Method of Inspection, Sampling and Testing.  
FED-STD-601 - Rubber: Sampling and Testing.

##### MILITARY

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

(Copies of specifications, standards, drawings, and publications 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 otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

#### UNIFORM CLASSIFICATION COMMITTEE

## Uniform Freight Classification Rules

(Application for copies should be addressed to the Uniform Classification Committee, 202 Union Station, 516 West Jackson Blvd., Chicago, Illinois 60606.)

### DEPARTMENT OF TRANSPORTATION

Title 49, Parts 171-178 - Interstate Commerce Commission Rules and Regulations for Transportation of Explosives and other Dangerous Articles.

(Copies may be obtained from the superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

FSC 8040

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)  
D-1084 - Tests for Consistency of Adhesives.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

MANUFACTURING CHEMISTS ASSOCIATION MANUAL

(Copies may be obtained from the Manufacturing Chemists Association, Inc., 1625 Eye Street, N.W., Washington, D. C. 20006.)

(Technical Society and Technical Association Specifications and Standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

### 3. REQUIREMENTS

3.1 Qualification. Adhesive furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.2 and 6.3).

3.2 Material. The adhesive shall be dispersed in an aqueous medium or shall be dissolved in volatile organic solvents. The dispersion or solution shall be free from gel lumps, skin, gel, and contaminants and shall not form sediment which cannot be readily dispersed. The adhesive shall not adversely affect, initially or in service, the plastic insulation to which it is applied.

3.2.1 Toxicity. Any solvent, dispersing medium, or volatile component of the adhesive shall have no objectionable odor and shall not contain any benzene or carbon tetrachloride. The dried adhesive shall not omit nauseous, irritating, or toxic volatile matter or aerosols when the adhesive is heated to any temperature up to 100 deg. C (212 deg. F.).

3.2.2 Dispersing medium or solvent.

3.2.2.1 Type I adhesive. The dispersing medium shall contain no chlorine or other halogen (see 4.5.2). The adhesive shall not have a flash point below 60 deg. C. (140 deg. F.) or a fire point below 75 deg. C. (167 deg. F.) when tested in accordance with 4.5.3.

3.2.2.2 Type II adhesive. The solvent shall contain no chlorine or other halogen (see 4.5.2).

3.2.2.2.1 Class 1. The adhesive shall have a flash point below minus 3.9 deg. C. (25 deg. F.).

3.2.2.2.2 Class 2. The adhesive shall not have a flash point below 15.6 deg. C. (60 deg. F.). The flash point shall be determined as specified in 4.5.3.

3.2.2.3 Type III. Adhesive. The adhesive shall not have a fire point below 93.3 deg. C. (200 deg. F.) when test in accordance with 4.5.3.

3.3 Application requirement. The adhesive shall be suitable for application by brush or roller without further treatment, except for stirring. A one-coat application to both the insulation and to the primed metal surfaces shall be sufficient to meet all the other requirements specified herein.

3.4 Storage life. The adhesive, as furnished by the supplier, shall meet all requirement of this specification after storage for one year, when tested

as specified in 4.5.4.

3.5 Physical requirements. The adhesive shall conform to the requirements of table I.

Table I - Physical requirements.

Property	Requirement	Test Method
Tensional adhesion[1] Under load of 10 pounds per square foot at 37.8 deg. C (100 deg. F) for 168 hours in air.	Sustain load	4.5.5

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Table I - Physical requirements (continued).

Property	Requirement	Test Method
Under load of 10 pounds per square foot at 71.1 deg. C (160 deg. F) for 24 hours in air.	Sustain load	4.5.5
Under load of 10 pounds per square foot at -6.7 deg. C (20 deg. F) for 24 hours in air.	Sustain load	4.5.5
Under load of 20 pounds per square foot at 37.8 deg. C (100 deg. F) for 168 in distilled water.	Sustain load	4.5.5
Tensile strength of cemented joints (Type II and III only)		4.5.6
Immediate, psi minimum	30	4.5.6.2
After accelerated aging, psi, minimum	20	4.5.6.3
Thermal shrinkage displacement of bonded insulation at primed steel interface	No displacement of insulation	4.5.7
Viscosity, range, centipoises	200 to 3,000	4.5.8
Corrosive Effect	No corrosion of steel	4.5.9

[1] Tensional adhesion between insulation and primed steel shall be conducted in sequence on the same specimens.

3.6 Volume of adhesive. The volume of the adhesive shall not differ by more than 3.0 percent from the volume marked on the container when determined in accordance with 4.5.10.

3.7 Identification markings and instructions for use. Each container of adhesive shall be marked to provide the following information: Specification number, and volume of adhesive in container. Instructions for use shall cover application procedure, including recommended film thickness and expected coverage for the unit container, air drying time for given temperature and humidity, open time of adhesive coated material after drying, recommended storage temperature and expected life, method of cleaning equipment, safety precautions and any other information required for proper use. Use of manufacturers commercial label shall be permitted, provided the aforementioned information is provided. The sides of all containers, including shipping containers shall be marked "Store In A Cool Place". Containers of Type I material shall also be marked "Prevent From Freezing".

3.7.1 Hazardous chemicals. All interior unit and intermediate packages

and exterior shipping containers for hazardous chemicals shall carry appropriate warning labels. Additional information required by the Department of Transportation Regulations, Title 49, Parts 171-178, and the Manufacturing Chemists Association Manual L-1 shall be included in the marking on the container.

3.8 Workmanship. Workmanship shall be of the quality necessary to insure a uniform packaged product. Occurrence of defects shall not exceed the applicable rejection number (see 4.3.2).

#### 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.

4.2 Qualification tests. Qualification tests shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center. Qualification tests shall consist of the test specified in 4.5. Application for qualification tests shall be made in accordance with Provisions Governing Qualification SD-6 (see 6.3 and 6.3.1).

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## 4.3 Sampling for quality conformance inspection.

4.3.1 Lot. For purposes of sampling, examination and tests, a lot shall not exceed 300 gallons and shall consist of all the material produced in one plant under essentially the same conditions and offered for delivery at one time.

4.3.2 Sampling for examination of filled containers. Representative samples of filled container shall be taken at random from each lot in accordance with the sampling plan given in table II for the examinations specified in 4.4.1.

Table II - Sampling for examination.

Number of filled containers in lot	Number of filled containers to be sampled	Number of defective containers	
		Major defects	Total defects
		Acceptance number	Acceptance number
up to 8	all	0	0
9 to 90	5	0	1
91 to 280	13	1	3
281 to 500	20	2	5
501 to 1200	32	3	7
1201 to 3200	50	5	10

4.3.2.1 Definition of defects. A major defect is likely to prevent or to reduce materially the usability of the unit of product for its intended purpose. A minor defect is not likely to reduce materially, the usability of the unit of product for its intended purpose. Total defects are the sum of major and minor defects.

4.3.3 Sampling for tests. Representative material shall be taken at random for each lot that passes the requirements of 4.4.1 in sufficient quantity to conduct the tests specified in 4.4.2.

## 4.4 Quality conformance examinations and tests.

4.4.1 Examination. Each of the filled container samples, selected in accordance with 4.3.2, shall be examined to determine compliance with the requirements of 3.7, 3.8 and section 5 of this specification. Specific items shall be examined for the defects listed in table III. If the number of defects exceeds the applicable acceptance numbers specified in table II, this shall be cause for rejection of the lot represented by the sample.

Table III - List of defects.

Examine	Major
	Warning marking or labels not provided to protect personnel from burns, toxicity, asphyxiation, or explosion.
	Evidence of unit container leakage.
	Container not type specified; not new.
	Container metal thickness (cans only) not in accordance with established commercial practice for type of container.

Containers

Closure not the type specified; not tight.

(a) Screw cap.

(b) Multiple friction plug.

(c) Lug cover.

(d) Tight head plug and vent.

Size (capacity) not as specified.

Inner seal (metal friction type) not seated;  
damaged.

Gasket missing, not seated or damaged.

Gaskets not of material compatible with the product  
contained.

Marking (as to content) not as specified,  
incomplete or illegible; damaged.

Container coating (internal) not compatible with  
product contained; external coating damaged.

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Table III - List of defects (Continued)

Examine	Major
Packing	Product containers not all of same type and capacity. Arrangement of product containers not as specified. Separators, buffer-pads, cell spacers not as specified; closures, handles, or balls not protected. Commercial packing (level C) (when specified) not conforming to carriers rules and regulations does not insure safe delivery at destination.
Shipping containers	Not conforming to the applicable specification; damaged. Not filled. Closing and strapping (level A) not as specified. Reinforcing tape (fiber boxes) (when used) not applied as specified; not type of tape specified. Steel strapping not the type specified. Palletized unit loads (when authorized for pails and drums) not palletized as specified. Closing of class 1 fiber boxes (level B packing) (when specified by Army) not accomplished as specified.
	Minor
Shipping containers	Dents, scratches, not clean. Closures damaged (burrs, sharp edges). Evidence of rust or corrosion. Bail or handle missing or damaged. Bail grip damaged. Marking of intermediate container incorrect, incomplete, not legible. Marking of shipping container incorrect, incomplete, not legible.

4.4.2 Quality conformance tests. The samples selected in accordance with 4.3.3 shall be subjected to the following tests:

Test	Test Paragraph
Halogens (Types I and II only)	4.5.2
Flash Point (Types I and II only)	4.5.3
Fire Point (Type II only)	4.5.3
Tensional adhesion (37.8 deg. C only)	4.5.5.2
Tensile strength, immediate (Types II and III only)	4.5.6.2
Viscosity	4.5.8
Volume	4.5.10

4.4.2.1 Action in case of nonconformance. If a sample tested is found not to be in conformance with the requirements of this specification, this shall be cause for rejection of the lot which it represents.

#### 4.5 Test methods.

4.5.1 Plastic insulation. The plastic insulation used for testing the adhesive shall conform to a requirements of MIL-P-15280, type II. Unless otherwise specified (see 6.2), the insulation thickness shall be nominally

one inch.

#### 4.5.2 Presence of halogenated material in dispersing medium or solvent.[1]

4.5.2.1 Test. The adhesive shall be well stirred. Brush coat of inside, bottom of a clean, wide-mouth one half pint can with the adhesive. Seal the can immediately, and store for 24 +/- 1/4 hours at 25 deg. +/- 1.2 deg. C (77 deg. +/- 2 deg. F). After 24 hours, remove the lid and immediately sample the head space vapors with a halide leak detector.[2] A green/blue flame indicates the presence of a halogen in the tested material. If a green or blue color is not obtained, the material is considered to be free of halogenated hydrocarbons.

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[1] This test will not indicate the presence of the halogen, fluorine.

[2] Bernz-O-Matic Leak Detector. Model No. TX-3, or A Turner Halide Gas Leak Detector, Model LP777, or Equivalent.

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4.5.2.2 Confirmatory tests. Since a positive test for chlorine or other halogen may be due to the presence of these elements in the polymer, but not in the dispersing medium or solvent, it is necessary to confirm their presence in the latter materials.

4.5.2.2.1 Confirmatory tests (type I only). Thirty milliliters (ml) of type I adhesive in a covered glass container shall be frozen. After freezing, the container shall be allowed to stand at ambient temperature for not less than 16 hours to completely melt the contents. The coagulated material shall then be separated from the liquid. The latter shall be tested for the presence of halogen (see 4.5.2.1).

4.5.2.2.2 Confirmatory test (type II only). Thirty ml of solvent shall be distilled from 100 ml of type II adhesive. Clean glassware shall be used for the still, condenser, and receiver. Care must be taken to prevent forming over of the adhesive. All of the distilled liquid shall be condensed. The distillate shall be tested for the presence of halogen (see 4.5.2.1).

4.5.3 Flash and fire points. Method 4291 of FED-STD-141 shall be used to determine the flash and fire points of the adhesive.

4.5.4 Storage life. The adhesive shall be stored for one year at 10 deg. to 2.2 deg. C (50 to 90 deg. F.) in an unopened container conforming to the applicable packaging provision specified herein. After this storage period the adhesive shall be subjected to all the tests specified in 4.5.

4.5.4.1 Certification. The manufacturer shall certify and shall support the certification with test data that the adhesive after being stored in its original unopened container for one year at the above temperature will meet all the requirements of this specification.

4.5.5 Tensional adhesion.

4.5.5.1 Test specimen. The test specimen shall consist of a 4-inch diameter disc of flexible, unicellular plastic material (see 4.5.1) sandwiched between, and adhered to, two 4-inch diameter primed steel discs (see 4.5.5.2). Each steel disc shall be 1/8 inch thick and have a tapped hole for a 10-32 screw in its center. A sketch of the test specimen is shown in figure 1. Six specimens shall be used for the tensional adhesion tests.

4.5.5.2 Preparation of steel discs. The steel discs shall be cleaned by sandblasting using 40-mesh or finer sand (or similar abrasive). The cleaned surfaces shall be painted with zinc chromate primer, Standard Formula 84/47 of TT-P-645. The film of primer on each steel disc shall be dried for at least 16 hours at 26.7 deg.  $\pm$  5 deg. C. (80  $\pm$  9 deg. F.) and at least 70 hours at 43.00 deg.  $\pm$  2 deg. C. (110 deg.  $\pm$  3.6 deg. F.) before the disc is used.

4.5.5.3 Preparation of specimens. The primed metal discs and the pieces of insulation shall be conditioned prior to assembly for a minimum of 16 hours at 10 deg.  $\pm$  1.1 deg. C. (50 deg.  $\pm$  2 deg. F.) and not more than 70 percent relative humidity. While still in this atmosphere, one coat of the adhesive shall be applied by brushing to the primed faces of twelve steel discs and to both faces of six pieces of insulation. After a one-hour drying time in the same atmosphere, three specimens shall be assembled. The remaining three specimens shall be assembled after a total two-hour drying time in the same atmosphere. For the assembly of each specimen, the adhesive-coated faces shall be contacted at one point of their circumference in a relative position to each other so that both faces will closely match after joining. The insulation shall then be slightly curved away from the

metal disc in the direction of joining while maintaining the point contact. The insulation disc shall then be progressively contacted with the entire face of the steel disc. A polyethylene sheet may be used for manipulating the insulation. The assembly of the specimen shall be completed by contacting the coated face of the second steel disc with the open insulation face at one point of their circumferences and progressively joining the two faces. Hand pressure shall be applied to the specimen to insure full contact over the entire joint area. The specified assembling technique serves to avoid air entrapment between the two adhesive lines.

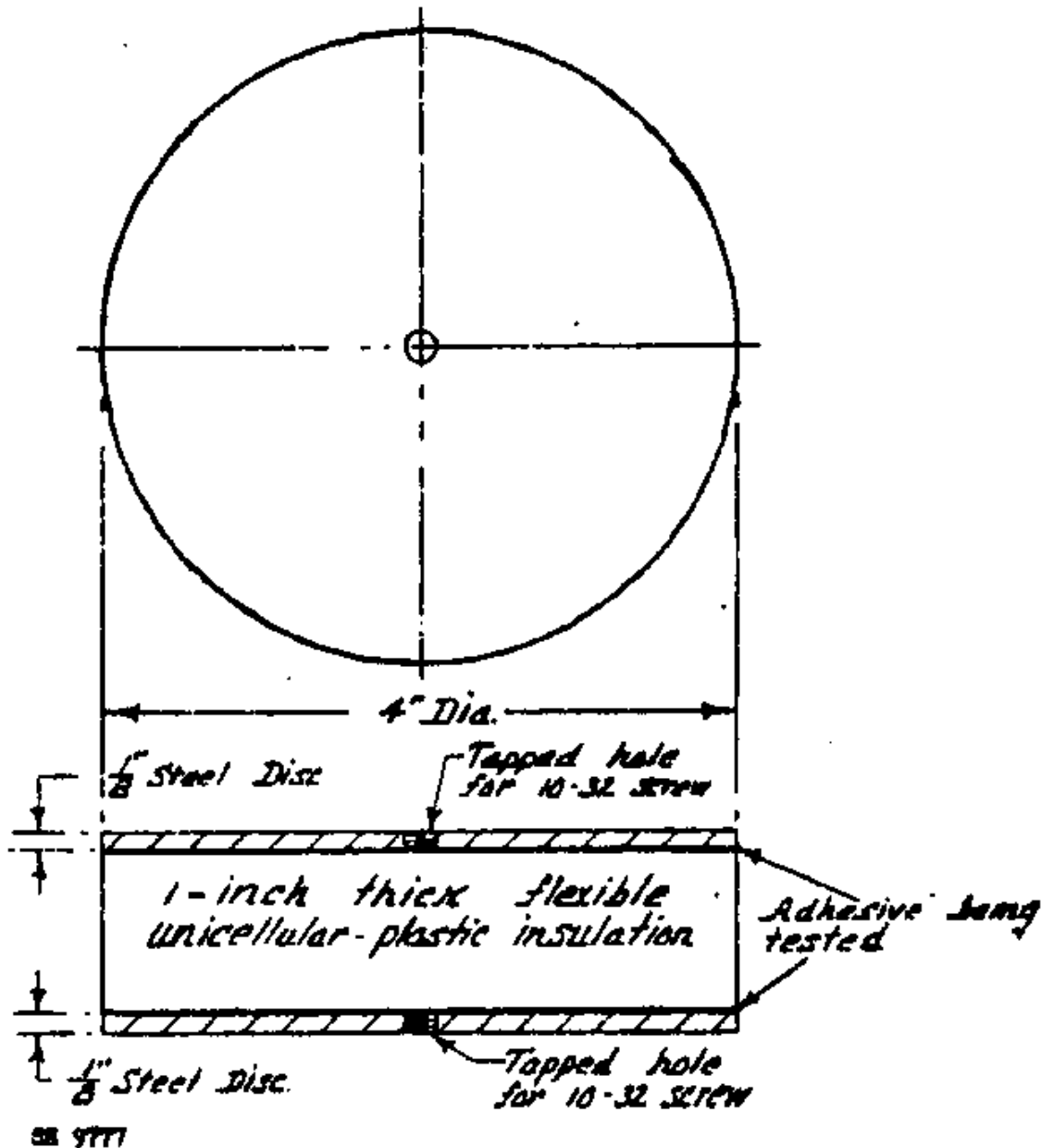
4.5.5.4 Test procedure. Immediately after assembly, each specimen shall be suspended from a suitable support by means of a central screw threaded into the top steel disc, and a load shall be suspended from a central screw threaded into the lower steel disc. The suspended load plus the weights of the lower steel disc and screw shall equal 396 plus or minus 5 grams (equivalent to 10 pounds per square foot tensional stress on the lower adhesive film). The loaded specimens shall then be subjected to the following sequence of conditions:

- (a) In air at 37.8 deg.  $\pm$  1.1 deg. C (100 deg.  $\pm$  2 deg. F.) for 168 plus or minus 2 hours.
- (b) In air at 71.1 deg.  $\pm$  1.1 deg. C. (160 deg.  $\pm$  2 deg. F.) for 24 plus or minus 2 hours.
- (c) In air at -6.7 deg.  $\pm$  1.1 deg. C. (20 deg.  $\pm$  2 deg. F.) for 24 plus or minus 2 hours.

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- (d) In distilled water at 37.8 deg.  $\pm$  1.1 deg. C. (100 deg.  $\pm$  2 deg. F.) for 168 plus or minus 2 hours.

For this condition the suspended weight shall be increased to maintain a force of 396 plus or minus 5 grams on the lower adhesive film. The amount of weight to be used can be established by suspending a typical steel disc and screw from a balance of 0.1 gram sensitivity with a thin wire or cord, immersing the disc and screw in distilled water, and adding weight to the immersed disc and bolt until a reading of 396 grams is obtained on the balance.



NOTE:  $\frac{1}{8}$ " Steel discs are coated with Zinc Chromate B4/47 primer

Figure 1 - Specimen for tensile adhesion tests.

4.5.5.5 Special quality conformance test. For quality conformance tests (see 4.4.2), only sequential test step (a) of 4.5.5.4 shall be performed for the tensional adhesion test except that the testing time shall be 24 plus or minus 2 hours.

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4.5.5.6 Action in case of failure. Failure of more than one specimen prepared under identical drying conditions during the sequential testing shall be cause for rejection. If only one specimen fails during this sequence, an additional three specimens shall be subjected to the sequential testing. All three additional specimens must sustain the specified load for the complete sequence.

4.5.6 Tensile strength of cemented joints (types II and III only).

4.5.6.1 Preparation of specimens and method of test. Dumbbell-shaped specimens of 1/2 plus or minus 1/16 inch thick plastic insulation (see 4.5.1) prepared by using die I of method 4111 of FED-STD-601, shall be cut in half at the center of the constricted portion. Care should be taken that the specimens are cut cleanly as a ragged cut could provide low test results. The cut surfaces of each half shall be covered with one brush coat of adhesive. The coating of type II or type III, as applicable, shall be allowed to air dry for ten minutes. After drying, the coated insulation surfaces shall be immediately joined with gentle hand pressure to assure complete contact. The test assemblies shall be prepared and tested (see 4.5.6.2 and 4.5.6.3) at 26.7 deg. +/- 5 deg. C. (80 deg. +/- 9 deg. F.) and not more than 70 percent relative humidity. Three specimens shall be tested under each of the conditions specified in 4.5.6.2 and 4.5.6.3. The tensile strength of the cemented joints shall be recorded to the nearest pound per square inch. The average of each three test results shall be reported. Method 4111 of FED-STD-601 shall be used for the determination of the tensile strength of the joints except that the rate of travel of the power actuated grip shall be 2 inches per minute. If the tensile strength of the joint is greater than that of the insulation, the adhesive shall be considered to pass the test.

4.5.6.2 Immediate tensile strength. Testing of the specimens prepared in accordance with 4.5.6.1 shall be started within five minutes after completion of assembly. The test method shall be as specified in 4.5.6.1.

4.5.6.3 Tensile strength after accelerated aging. Specimens, prepared in accordance with 4.5.6.1 shall be aged on a wire screen in air at 71.1 deg. +/- deg. C. (160 deg. +/- 2 deg. F.) for seven days. They shall then be conditioned for a minimum of four hours at 26.7 deg. +/- 5 deg. C. (80 deg. +/- 9 deg. F.) and not more than 70 percent relative humidity prior to testing as specified in 4.5.6.1.

4.5.7 Thermal shrinkage. Each specimen consists of a 3 by 24-inch piece of insulation (see 4.5.1), which is adhered on one face to a 1/8 by 4 by 26-inch mild steel plate. Two steel plates, cleaned and primed as specified in 4.5.5.2 and two pieces of insulation shall be conditioned for a minimum of 16 hours at 37.8 deg. +/- 1.1 deg. C. (100 deg. +/- 2 deg. F.) before brush coating one face of each piece of insulation and the primed faces of each of the two metal plates with the adhesive. Adhesive drying periods for the two specimens shall be one half hour and one hour, respectively at the conditioning temperature. The insulation shall then be adhered to the metal and cut straight across the width of the insulation to the metal to form two places, each approximately twelve inches long. The specimens shall then be immediately conditioned at 10 deg. +/- 1.1 deg. C. (50 deg. +/- 2 deg. F.) for a minimum of sixteen hours. The specimen shall then be examined visually at the latter temperature for opening of the cut at the insulation-adhesive interface.

4.5.8 Viscosity. One specimen shall be used. The viscosity shall be determined in accordance with method B of ASTM D 1084 with the following exceptions. The Brookfield Synchro-Lectric Viscosimeter, Multispeed Model

RVT, or equivalent, shall be used. Test equipment and adhesive sample shall be conditioned at least 5 hours at 23.0 deg.  $\pm$  1.1 deg. C. (73.5 deg.  $\pm$  2 deg. F.) and testing shall be performed at this temperature. The adhesive shall be tested in a 600 ml capacity low-form beaker or similar container, approximately 85 mm inside diameter, filled to a depth of at least 100 mm. A spindle guard shall be used. Manufacturers' instructions for operation of the viscosimeter and calculation of results shall be used as applicable. At least two instrument readings shall be taken for each specimen.

4.5.9 Corrosive effect. A 2-inch by 12-inch by 1/8-inch mild steel plate shall be primed over the entire surface as specified in 4.5.5.2. The primed steel surface shall be coated with the adhesive and the adhesive allowed to dry at least 70 hours at ambient temperature. The specimen shall then be partially immersed in a vertical position in distilled water at 37.8 deg.  $\pm$  1.1 deg. C. (100 deg.  $\pm$  2 deg. F.) for 168 plus or minus 2 hours. The specimen shall then be visually examined for evidence of corrosion of the steel. Two specimens shall be tested.

4.5.10 Volume of adhesive in filled container. The volume of adhesive in each of three containers selected for quality conformance examination (see 4.3.2) shall be tested as follows:

4.5.10.1 Cylindrical container. The height of the liquid in a cylindrical container shall be measured, such as by insertion of a dipstick. The volume of adhesive, expressed in gallons, shall be calculated by substituting the diameter (d) of the container in inches, and the height (h) of liquid in the

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container in inches, in the following equation:

$$V : \frac{d^2 \times h}{294}$$

4.5.10.2 Containers other than cylindrical. For determining the volume of adhesive in other than a cylindrical container, an empty container of identical size and shape may be used. The empty container shall be filled with water to the same level as the filled container, as determined with a dipstick. The water shall then be transferred to a graduated measuring vessel or to a cylindrical container for determination of volume (see 4.5.10.1).

#### 4.5.11 Toxicity.

4.5.11.1 Dispersing medium or solvent. For determination of toxicity (see 3.2.1) a one quart sample of the adhesive shall be selected and forwarded to a laboratory satisfactory to the Naval Ship Engineering Center for testing. For this test an intra-red spectrophotometric analysis or gas chromatograph analysis may be conducted.

4.5.11.2 Solids. A manufacturer of adhesive shall disclose the formulation of his product to the Naval Ship engineering Center Materials Development and Applications office, or to an activity acceptable to the Naval Ship Engineering Center, in detail sufficient to permit an accurate appraisal of the likelihood of generation of nauseous. irritation or toxic gases or Aerosols when the adhesive is heated to any temperature up to 100 deg. C (212 deg. F.).

4.6 Examination of preparation for delivery. Sample packages and packs shall be selected and examined to determine conformance with the requirements of section 5 herein (see 4.4.1 and table III).

### 5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.4.)

#### 5.1 Domestic shipment and early material Use. (See 5.3)

5.1.1 Preservation and packaging. Preservation and packaging shall be sufficient to afford adequate protection against deterioration and physical damage during shipment from the supply source to the using activity and until early material use and may conform to the supplier's commercial practice when such meets these requirements.

5.1.2 Packing. Packing shall be accomplished in a manner which will insure acceptance by common carrier at the lowest rate, and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early material use. The shipping containers or method of packing shall conform to the Uniform Freight Classification Rules, Ratings, and Regulations or other carrier regulations as applicable to the mode of transportation and may conform to the supplier's commercial practice when such meets these requirements.

5.1.3 Marking. In addition to the requirements of 3.7, shipment marking information shall be provided on interior packages and exterior shipping

containers in accordance with MIL-STD-129. The information shall include nomenclature, Federal stock number or manufacturer's part number, lot number, date (month and year) of manufacture, size, contract or order number, contractor's name, and destination.

5.2 Domestic shipment and storage or overseas shipment. The requirements and levels of packaging, packing and marking for shipment shall be specified by the procuring activity (see 6.2).

(5.2.1 The following provides various levels of protection during domestic shipment and storage or overseas shipments which may be required when procurement is made (see 6.2).)

5.2.1.1 Packaging.

5.2.1.1.1 Level A. Adhesives shall be packaged in metal containers conforming to PPP-C-96. The type, shape, and size of the container and type of closure shall be as specified by the procuring activity (see 6.2).

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5.2.1.1.2 Level C. Packaging shall be sufficient to afford adequate protection against deterioration and physical damage during shipment from the supply source to the using activity and until early material use and may conform to the supplier's commercial practice when such meets these requirements.

#### 5.2.1.2 Packing.

5.2.1.2.1 Level A. Adhesive, packaged as specified in 5.2.1.1.1, shall be packed in accordance with overseas shipment requirements of the appendix to PPP-C-96.

5.2.1.2.2 Level B. Adhesive, packaged as specified in 5.2.1.1.1, shall be packed in accordance with domestic shipment requirements of the appendix to PPP-C-96.

5.2.1.3 Marking. In addition to any special working required (see 3.7 and 6.2), interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129. The following precautionary marking shall appear on the sides of exterior containers of type I material: "Store In A Cool Place, Prevent From Freezing".

#### 5.3 Use of polystyrene (loose-fill) material.

5.3.1 For domestic shipment and early equipment installation and level C packaging and packing. Unless otherwise approved by the procuring activity (see 6.2), use of polystyrene (loose-fill) material for domestic shipment and early equipment installation and level C packaging and packing applications such as cushioning, filler and dunnage is prohibited. When approved, unit packages and containers (interior and exterior) shall be marked and labelled as follows:

##### "CAUTION

Contents cushioned etc. with polystyrene (loose-fill) material.  
Not to be taken aboard ship.  
Remove and discard loose-fill material before shipboard storage.  
If required, recushion with cellulosic material bound fiber,  
fiberboard or transparent flexible cellular material."

5.3.2 For level A packaging and level A and B packing. Use of polystyrene (loose-fill) material is prohibited for level A packaging and level A and B packing applications such as cushioning, filler and dunnage.

#### 6. NOTES

6.1 Intended use. Type I adhesive is intended for use at installation temperatures of 50 deg. F. or above, and in locations where flammability and explosion hazards prohibit the use of type II. Type II adhesive is intended for use both at lower temperatures and for prefabrication of parts from insulation in areas where adequate fire protection is provided and a limitation on the quantity of adhesive present is enforced. The selection of the class of type II adhesive depends on the bonding operation to be performed and on the atmospheric conditions during use.

6.1.2 Class 1 adhesive is best suited for assembly of prefabricated parts from plastic form insulation and for joining seams in plastic pipe insulation, since very short assembly periods are desirable in these operations. Class 1 adhesive is also suitable for attaching sheets of insulation to the interior surfaces of ships hulls if the temperature of the

hull is 45 deg. F. or lower and rapid air movement over the open surfaces coated with adhesive can not be provided.

6.1.3 Class 2 adhesive is recommended for use when rapid air movement is provided at low temperatures. Class 2 adhesive is also appropriate for use at higher temperatures in very humid, still air since in this atmosphere type I adhesive requires very long drying periods.

6.1.4 Type III adhesive is intended for general use in areas where type I and II are not specified and where halogenated solvents can be tolerated. Type III can be used in these areas with relatively little flammability and explosion risks. Types II and III require much shorter drying time before assembly than type I.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, numbers and date of this specification.
- (b) Type, class, and quantity of material (see 1.2, 3.2.1).

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- (c) Insulation thickness for testing, if other than nominal 1 inch (see 4.5.1).
- (d) Packaging, packing and marking requirements other than those required by 5.1 (see 5.2).
- (e) Type, class, shape, and size of containers and type of closure (see 5.2.1.1.1).
- (f) When use of polystyrene loose-fill material is approved (see 5.3.1).

6.3 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL 24179 whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, 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 orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Center Building, Prince George's Center, Hyattsville, Maryland 20792, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.4 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in Section 2 do not apply when material and parts are procured by the supplier for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.5 CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "\*" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTOR ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

Preparing activity:  
Navy - SH  
(Project 8040-N020)

MIL-A-24179A(SHIPS)  
AMENDMENT 2  
12 May 1980  
SUPERSEDING  
AMENDMENT - 1  
11 July 1969

MILITARY SPECIFICATION

ADHESIVE, FLEXIBLE UNICELLULAR-PLASTIC THERMAL INSULATION

This amendment forms a part of Military Specification MIL-A-24179A(SHIPS), dated 15 May 1969.

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\* 4.1: Delete and substitute:

"4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 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."

\* 4.2: Delete and substitute:

"4.2 Qualification tests. Qualification tests shall be conducted at a laboratory satisfactory to the Naval Sea Systems Command. Qualification tests shall consist of the tests specified in 4.5 (see 6.3 and 6.3.1)."

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4.5.6.2: Delete and substitute:

\* 4.5.6.2 Immediate tensile strength. Testing of the specimens prepared in accordance with 4.5.6.1 shall be started within twenty minutes after completion of assembly. The test, method shall be as specified in 4.5.6.1."

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\* 4.5.11, 4.5.11.1, and 4.5.11.2: Delete and substitute:

"4.5.11 Toxicity. A manufacturer of adhesive shall disclose the formulation of his product to the Chief, Bureau of Medicine and Surgery, Department of the Navy, Washington, DC 20372 in detail sufficient to permit an accurate appraisal of the likelihood of generation of nauseous, irritating or toxic gases or aerosols to any temperature up to 100 deg. C (212 deg. F)."

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MIL-A-24179A(SHIPS)  
AMENDMENT 2

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\* "6.3, Lines 8 and 9: Delete "Naval Ship Engineering Center, Center Building, Prince George's Center, Hyattsville, Maryland 20782" and substitute "Naval Sea Systems Command, SEA 3112, Department of the Navy, Washington, DC 20362".

NOTE: The margins of this amendment. are marked with an asterisk (\*) to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment 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 amendment.

Preparing activity:  
Navy - SH  
(Project 8040-N110)

VALIDATION NOTICE
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MIL-A-24179A(SHIPS)  
NOTICE 1  
22 June 1987

MILITARY SPECIFICATION

ADHESIVE, FLEXIBLE UNICELLULAR - PLASTIC THERMAL INSULATION

MIL-A-24179A(SHIPS) dated 15 May 1969, has been reviewed and determined to be valid for use in acquisition.

Preparing activity:  
Navy - SH

AMSC N/A

FSC 8040

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