

MIL-A-24456(SHIPS)
30 November 1971

MILITARY SPECIFICATION
ADHESIVE FOR PLASTIC VIBRATION-DAMPING TILES

1. SCOPE

1.1 This specification covers a two-part epoxy adhesive for bonding plastic vibration damping tiles to metal structures.

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 the specification to the extent specified herein

SPECIFICATIONS

FEDERAL

PPP-B-636 - Box, Fiberboard.
PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple-Wall.
PPP-C-96 - Can, Metal, 28 Gage and Lighter.
PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 through 12 Gallons).

MILITARY

MIL-S-901 - Shock Tests, H.I (High Impact); Shipboard Machinery, Equipment and Systems, Requirements For.
MIL-P-23236 - Paint Coating Systems, Steel Ship Tank, Fuel and Salt Water Ballast
MIL-P-23653 - Plastic Tiles, Vibration Damping

STANDARDS

MILITARY

MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-147 - Palletized and Containerized Unit Loads, 40" x 48" Pallets, Skids, Runners, or Pallet-Type Base.
MIL-STD-1341 - Symbols for Packages and Containers for Hazardous Industrial Chemicals and Materials.

(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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D2240-68 - Indentation Hardness of Rubber and Plastics by Means of a Durometer.
D471-66 - Change in Properties of Elastomeric Vulcanizates Resulting from Immersion in Liquids.

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

NATIONAL CLASSIFICATION BOARD

National Motor Freight Classification Rules.

(Application for copies should be addressed to the National Freight Traffic Association, Inc., 1616 P Street, N. W., Washington, D. C. 20036).

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules.

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

FSC 8040

MIL-A-24456(SHIPS)

CODE OF FEDERAL REGULATIONS

CFR Title 49, Parts 171-178 - Department of Transportation 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)

MANUFACTURING CHEMISTS ASSOCIATION MANUAL

L-1 - Warning Labels

(Copies may be obtained from the Manufacturing Chemists Association, Inc., 1625 I 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. The 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 and form. The adhesive shall be supplied in the form of a two-part system. One part shall contain the epoxy resin and the other part shall contain the hardener. When the two parts of the adhesive are combined in the weight proportions recommended by the manufacturer, the uncured and cured mixture shall meet all applicable requirements of this specification. The adhesive shall not contain solvents of any kind.

3.3 Color. The colors of the two components shall be contrasting when examined in accordance with 4.5.2. Thorough blending of the components shall produce a mixture having homogeneous color.

3.4 Viscosity and pot life. The adhesive, after mixing as specified in 3.2 and 4.5.3.1, shall have an initial viscosity of not more than 60 and a potlife viscosity of not more than 75 when tested as specified in 4.5.3.

3.5 Hardness. The hardness of the adhesive shall be 70 minimum at 73.5°F. and 55 minimum at 140°F when tested as specified in 4.5.4.

3.6 Resistance to accelerated aging. The hardness of the adhesive, after accelerated aging as specified in 4.5.5, shall be 90 maximum and shall not show a change of more than 10 points from its value at 73.5°F. as determined in 3.5.

3.7 Resistance to fuel. The hardness of the adhesive after immersion in the standard test fuel as specified in 4.5.6 shall be 70 minimum.

3.8 Resistance to water. The hardness of the adhesive after immersion in water as specified in 4.5.7 shall be 70 minimum.

3.9 Vertical slippage. The adhesive shall not allow a damping tile to slip more than 1/8 inch or to separate from a steel plate when tested as specified in 4.5.8.

3.10 Overhead sag. The adhesive shall not allow a damping tile to buckle, sag, or separate from a steel plate when tested as specified in 4.5.9.

3.11 Resistance to shock (high impact). When tested as specified in 4.5.10, there shall be no bond failure between the adhesive and the steel plate or between the adhesive and the damping tile.

3.12 Adhesion to painted steel. When tested as specified in 4.5.11, the strength of the adhesive bond shall be not less than 1000 psi initially, after accelerated aging, after water immersion and after immersion in the standard test fuel.

3.13 Adhesion to damping tile. When tested as specified in 4.5.12, the initial strength, strength after accelerated aging and strength after water immersion of the bond between the tile and the adhesive shall be not less than 80 psi.

3.14 Storage life. The adhesive shall meet the requirements of this specification after storage for one year under the conditions specified in 4.5.13. Furthermore, after storage for one year, there shall be no separation of ingredients in either component as determined by visual examination of the contents in each container.

3.15 Identification markings. Each container of the adhesive system shall be marked to provide the following information:

- (a) Specification number.
- (b) Federal stock number.
- (c) Name of manufacturer.
- (d) Manufacturer's identification number including designation of component, such as part A or part B.
- (e) Contract or order number.
- (f) Date of manufacture.
- (g) Volume or weight of adhesive component in container.
- (h) Instruction for Preparation of the adhesive including correct proportioning by weight to be used with other part of the adhesive.
- (i) Recommended storage conditions and limitations on working life.
- (j) Precautionary markings as follows:
 - (1) CAUTION: Do not mix resin and hardener together until ready for use.
 - (2) WARNING: The material in this container may cause skin irritation on some individuals. Avoid skin contact by wearing protective gloves or applying protective creams.
 - (3) Any other handling precautions considered necessary.
 - (4) Instructions for cleaning equipment that was used for application.

3 16 Workmanship Workmanship shall be of the quality necessary to insure a uniform, packaged product in conformance with the requirements of 4.4.

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 examination of 4.4.1 and the tests specified in 4.5 Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3 and 6.4).

4.3 Quality conformance inspection

4.3.1 Sampling

4.3.1.1 Lot For purposes of quality conformance inspection, a lot shall consist of all adhesive from one production batch offered for delivery at one time. The adhesive containers, and the packing and shipping containers enclosing these adhesive containers, shall be considered as part of the lot for the purpose of examination.

4.3.2 Sampling for examination. Random samples of adhesive containers, including the packing and shipping containers therewith, shall be selected in accordance with Table I for visual examination.

Table I. Sampling for examination of filled containers.

Lot size Number of adhesive containers	Sample size Number to be examined	Number of adhesive containers, packing and shipping containers having defects	
		Major defects Acceptance number	Total defects 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	4	10

4.3.2.1 Major defects. A major defect is a defect that could result in failure, or materially reduce the usability of the unit of product for its intended purpose.

4.3.2.2 Minor defects. A minor defect is one that does not materially reduce the usability of the unit product for its intended purpose, or is a departure from established standards having no significant bearing on the effective use or operation of the unit.

MIL-A-24456(SHIPS)

4.3.3 Sampling for test. Random samples of the epoxy resin component and the hardener component shall be taken from each lot of filled containers in sufficient quantity to conduct the tests specified in 4.4.2. This sampling need not be performed if the lot is rejected on the basis of the adhesive containers packing and shipping (see 4.4 1.1).

4.4 Examination.

4.4.1 Examination of filled containers. The adhesive containers, and the packing and shipping containers therewith, selected in accordance with 4.3.2 shall be examined for the defects specified in Table II

4.4.1.1 Rejection. The lot shall be rejected if the number of adhesive containers and packing and shipping containers selected in accordance with 4.3.2, which are found to be defective exceeds the acceptance number of table I. The lot shall be rejected if the samples of epoxy resin plus hardener selected in accordance with 4.3.3 are found not to conform to any of the requirements of 3.4, 3.5, 3.9, and 3.12

Table II Defects in adhesive containers, packing and shipping containers

Categories	Defects
Critical:	None defined
Major	Adhesive containers
101	Evidence of leakage.
102	Not type specified
103	Warning or caution marking on labels not provided
104	Capacity not as specified
105	Contents below the required or indicated fill.
106	Metal thickness not in accordance with type of container and product contained.
107	Gasket (if required) missing, not seated, or damaged.
108	Internal coating on metal not as specified
109	Rust or corrosion on exterior
	Packing of containers
110	Not conforming to carriers' rules and regulations
111	Not the level specified
112	Separators, buffer pads or cell spacers not as specified.
	Shipping containers
113	Not the type specified
114	Damaged
115	Not filled.
116	Reinforcing tape (when required) not type specified or correctly applied.
117	Closing and/or strapping not as specified.
118	Palletized containers (when specified) not correctly assembled.
	Adhesive containers
Minor:	
201	Not of same type and capacity
202	Dented, scratched, or dirty.
203	Marking incomplete, incorrect, or illegible
204	Bail or handle (when specified) missing or damaged
205	Bail grip (when specified), damaged.
	Packing of containers
206	Closures not as specified.
207	Handles or bails not protected
208	Arrangement of product containers not as specified
209	Marking incomplete, incorrect, or illegible.
	Shipping containers
210	Marking incorrect, incomplete, or illegible

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

Test	Test paragraph
Viscosity and pot life	4.5.3
Hardness (initial indentation only)	4.5.4
Vertical slippage	4.5.8
Adhesion to painted steel	4.5.11

4.5 Tests Unless otherwise indicated in the particular test procedure, tests shall not be conducted prior to conditioning the test specimens in air for a period of 4 hours at $27^{\circ} \pm 5^{\circ}\text{C}$. ($80^{\circ} \pm 9^{\circ}\text{F}$). Sample preparation may be undertaken without regard to this time interval.

4.5.1 Testing conditions. Unless otherwise specified, the testing shall be conducted at $80^{\circ} \pm 9^{\circ}\text{F}$.

4.5.2 Color. By visual examination, the colors of the two parts of the adhesive shall be contrasting. Completeness of mixing of the two parts shall be evidenced by disappearance of color streaks and the formation of a homogeneous color different than either part of the adhesive.

4.5.3 Viscosity and pot life The viscosity of the adhesive shall be determined with a Brookfield Model HBF or Model HBT Synchro-Lectric Viscometer. The viscometer shall be mounted in a Brookfield Helipath Stand. Measurements shall be made at $73.5^{\circ} \pm 2^{\circ}\text{F}$. at 1 RPM with a T-C spindle.

4.5.3.1 The two components of the adhesive, in the proportions recommended by the manufacturer, shall be blended together until the mixture is of homogeneous color. The time required to do this shall be noted and the blending operation continued for an equal amount of time. At the completion of blending operations the adhesive shall be immediately transferred to an open-top, cylindrical container. The container shall be at least 2 inches in diameter and the adhesive in the container shall have a depth of at least 3 inches. Care shall be taken to minimize occlusion of air in the adhesive when transferring.

4.5.3.2 The supplementary weight furnished with the viscometer shall be attached to the close-coupling assembly and the T-C spindle clamped in the chuck. The viscometer shall then be lowered until the cross piece is covered by about $1/4$ inch of adhesive. Start the viscometer and let the dial make 2 revolutions before starting the Helipath Stand. Record the next two readings to the nearest whole number as the needle passes a predetermined spot on the viscometer window. The two readings shall be averaged and the result reported as the initial viscosity. The initial viscosity measurements must be completed within 30 minutes after start of blending operations.

4.5.3.3 Immediately after completing initial viscosity measurements, the adhesive shall be removed from the cylindrical container and spread out on a metal plate to a maximum depth of $1/4$ inch. One hour and twenty-five minutes after start of blending operations, the adhesive shall be removed from the metal plate, placed again into the cylindrical container and the viscosity redetermined as described in 4.5.3.2. The viscosity determined shall be termed the pot-life viscosity.

4.5.4 Hardness. The hardness of the adhesive shall conform to ASTM D2240 when measured with a type D durometer.

4.5.4.1 Specimen preparation The hardness shall be measured on specimens approximately 2 inches in diameter by 0.5 ± 0.1 inch thick and having smooth, parallel faces. The specimens shall be prepared by casting the mixed adhesive in a suitable open mold. The adhesive shall be mixed as specified in 4.5.3.1. While the adhesive is still in a semi-fluid state, the mold and contents shall be placed in a chamber and subjected to 1000 to 1500 psig nitrogen gas pressure at room temperature for 16 to 24 hours. The specimen shall then be removed from the mold and placed in an air oven for 5 days at $120^{\circ} \pm 2^{\circ}\text{F}$. For acceptance testing, the stabilizing operation may be omitted if desired; however, the test specimen must still meet the requirements for initial hardness. The specimen shall then be machined to the required dimensions. Three test specimens shall be prepared.

4.5.4.2 Test procedure. The specimens shall be conditioned at the testing temperature for a minimum of two hours immediately before start of test operations. Press the indenter of the durometer firmly into one flat side of the specimen and note the durometer indication 3 seconds after initial indentation. Assure that the base of the durometer presses against a smooth machined surface of the specimen and that the indenter is not closer than $1/4$ inch to the edge of the specimen. Make three readings, each at least $1/4$ inch apart on the specimen, and average the results.

4.5.5 Resistance to accelerated aging. Resistance to accelerated aging shall be determined by the change in hardness produced by conditioning the hardness specimens in an air oven for two weeks at $158^{\circ} \pm 2^{\circ}\text{F}$. Three test specimens prepared as described in 4.5.4.1 shall be used. At the conclusion of the aging period, the specimens shall be removed from the oven and allowed to cool at $73.5^{\circ} \pm 2^{\circ}\text{F}$. for at least two hours. Hardness measurements shall then be made as specified in 4.5.4.2. The results shall be averaged.

4.5.6 Resistance to fuel Resistance to fuel shall be determined by the change in hardness resulting from immersion of the specimens in Reference Fuel B specified in ASTM D471. This fuel is a 70/30 mixture by volume of iso-octane with toluene. Three specimens prepared as specified in 4.5.4.1 shall be used in this test. Each specimen shall be placed in a separate container and the specimen covered with a volume of fuel equivalent to 12 to 20 times the volume of the test specimen. The immersed specimens shall be kept at $73.5^{\circ} \pm 2^{\circ}\text{F}$ for two weeks. The specimens shall then be removed, one at a time, from the fuel, blotted dry, and their hardness determined within one minute after removal from the fuel as specified in 4.5.4.2. The results shall be averaged.

4.5.7 Resistance to water. Resistance to water shall be determined by the change in hardness resulting from immersion of the specimens in distilled water. Three specimens prepared as specified in 4.5.4.1 shall be

MIL-A-24456 (SHIPS)

used in this test. Each specimen shall be placed in a separate container and the specimen covered with a volume of water equivalent to 12 to 20 times the volume of the test specimen. The immersed specimens shall be kept at $120^{\circ} \pm 2^{\circ}\text{F.}$ for a period of two weeks. At the conclusion of this conditioning period, the water shall be poured off and a fresh portion of cool distilled water poured over the specimens. The specimens shall be allowed to cool at $73.5^{\circ} \pm 2^{\circ}\text{F.}$ in the water for at least two hours but not more than four hours. They then shall be removed, one at a time, blotted dry and their hardness determined within one minute after removal from the water as specified in 4.5.4.2. The results of measurements on the three specimens shall be averaged.

4.5.8 Vertical slippage. Vertical slippage of a damping tile applied to a simulated vertical installation shall be measured at $73.5^{\circ} \pm 2^{\circ}\text{F.}$ as follows:

- (a) A steel plate $3/8$ by 16 by 16 inches in size shall be painted with a type I, class 1 paint system in accordance with MIL-P-23236. The plate shall be sandblasted prior to painting. The paint on the plate shall be allowed to cure one week minimum, three months maximum, prior to use of the plate.
- (b) The adhesive, mixed as specified in 4.5.3, shall be applied to one side of the tile and to the central foot square area of the painted steel plate with a serrated tool having equilateral triangular grooves in the spreading edge. The grooves shall intersect each other and shall be $3/16$ inch deep. The tile shall be placed against the coated steel plate so that the rows of adhesive formed by the serrated tool on the tile and on the plate are parallel and run from the edge of the tile designated top to the edge of the tile designated bottom. The tile shall now be pressed firmly against the plate with a hand roller thus forcing all excess adhesive to be extruded from beneath the tile. This excess adhesive shall be removed and discarded. A horizontal line shall be scribed across the plate at the edge of the tile designated bottom.
- (c) The assembly shall be secured in a vertical position with edge of the tile designated bottom facing downward. The installation of the tile and the securing of the assembly shall be accomplished within 30 minutes after mixing the adhesive.
- (d) Twelve hours minimum after placing the assembly in a vertical position, the amount of vertical slippage, buckling of the tile, or separation of the tile from the surface shall be noted and recorded.

4.5.9 Overhead sag. Overhead sag of a damping tile applied in a simulated overhead installation shall be measured at $73.5^{\circ} \pm 2^{\circ}\text{F.}$ as follows:

- (a) An assembly of a steel plate and damping tile shall be prepared exactly as specified in 4.5.8 (a) and (b), except that no reference line need be drawn.
- (b) The assembly shall be placed in a horizontal position with the steel plate supported at the edges and the side with installed tile facing downward. The installation of the tile on the plate and the positioning of the assembly shall be accomplished within 30 minutes after mixing the adhesive.
- (c) Twelve hours minimum after placing the assembly in position, the amount of sag, buckling, or separation of the tile from the steel surface shall be noted and recorded.

4.5.10 Resistance to shock. The resistance of the adhesive to mechanical shock shall be determined on the lightweight shock machine specified in MIL-S-901 using test specimens consisting of damping tiles bonded to painted steel plates.

4.5.10.1 Specimen preparation

4.5.10.1.1 Five steel plates $3/8$ by 16 by 16 inches in size shall be painted with a type I, class 1 paint system in accordance with MIL-P-23236. The plates shall be degreased and sandblasted prior to painting operations. The paint on the plates shall be allowed to cure for one week minimum and three months maximum before installing tiles on the painted surfaces.

4.5.10.1.2 One damping tile, in accordance with class 1 of MIL-P-23653, shall be bonded to the central portion of each painted plate in the manner specified in 4.5.8 (b) except that no reference line need be scribed. The assemblies may be placed in a plastic bag and the air evacuated in order to obtain a uniform pressure across the face of the tile until the adhesive sets. The assemblies shall be kept at ambient room temperature for 16 to 24 hours and then they shall be placed in an air oven at $120^{\circ} \pm 2^{\circ}\text{F.}$ for five days.

4.5.10.2 Testing for shock resistance.

4.5.10.2.1 The assemblies shall be mounted in a vertical position on the central portion of the anvil plate of the shock machine. The assembly shall be secured with four $7/8$ inch diameter bolts, one located in each of the four corners. The assembly shall be held 1 inch away from the anvil plate by means of spacers 2 inches in diameter placed around each securing bolt. Prior to mounting the assembly in the shock machine, it shall be cooled to 32° to 35°F. by placing in a mixture of crushed ice and water for at least 2 hours. Shock testing of the assembly shall be accomplished within 10 minutes after removal from the cooling mixture.

4.5.10.2.2 Each assembly shall be subjected to the following sequence of blows from the falling weight:

- (a) Two 5-foot back blows.
- (b) Two 5-foot top blows - Retighten all hold-down bolts
- (c) Two 5-foot top blows
- (d) Two 5-foot back blows

Examine the assembly for bond failure after each blow from the falling weight

4.5.11 Adhesion to painted steel Adhesion to painted steel shall be determined in tension as described in the following paragraphs.

4.5.11.1 Specimen preparation The test specimen shall consist of two flat steel disks, 1.59 inch in diameter by 3/8 inch in thickness, bonded together with the adhesive. The opposite face of each steel disk shall have a centrally located threaded stud 1/2 inch in diameter by 1 inch long. One face of each of the metal disks shall be degreased, sandblasted and painted with a type I, class 1 paint system in accordance with MIL-P-23236. The paint shall be allowed to cure for one week minimum, three months maximum, before using the disks. The adhesive shall be mixed as specified in 4.5.3.1 and applied to the painted faces of the metal disks, using a hacksaw blade with 18 teeth per inch as an applicator. The coated sides of the disks shall be pressed together with sufficient pressure to cause the adhesive to extrude from between the faces of the disks. The final adhesive layer shall not exceed 1/32 inch in thickness. Twelve replicate specimens shall be prepared. The assembled specimens shall be kept at ambient room temperature for 16 to 24 hours and then they shall be placed in an air oven at $120^{\circ}\text{C} \pm 2^{\circ}\text{F}$ for 5 days. This stabilizing cure may be omitted if desired when preparing specimens for the quality conformance tests specified in 4.4.2. A drawing of an assembled test specimen is shown in Figure 1.

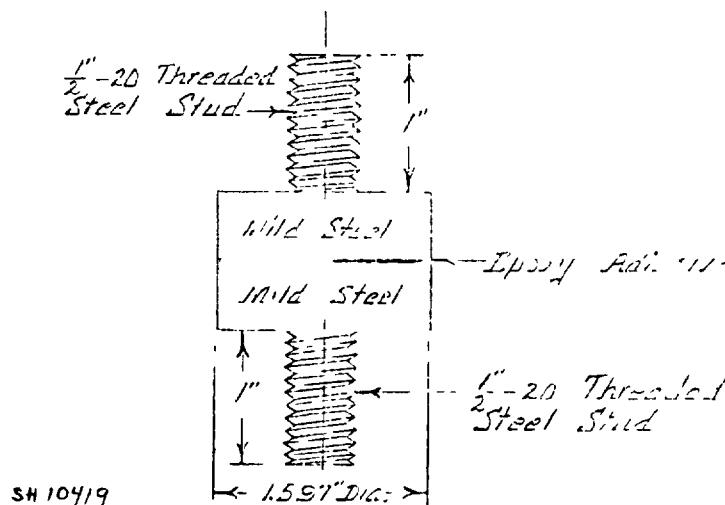


Figure 1 - Test specimen for measuring adhesion to painted steel

4.5.11.2 Conditioning After completion of curing operations, three specimens shall be exposed to a temperature of $158^{\circ}\text{F} \pm 2^{\circ}\text{F}$ in an air-circulating oven for two weeks, three specimens shall be immersed in 12 to 20 times their volume of distilled water at $120^{\circ}\text{F} \pm 2^{\circ}\text{F}$ temperature for two weeks and three specimens shall be immersed in 12 to 20 times their volumes of Reference Fuel B of ASTM D 471 (4.5.6) for two weeks at $73.5^{\circ}\text{F} \pm 2^{\circ}\text{F}$. The three remaining specimens shall be used for measuring initial bond strength.

4.5.11.2.1 After conclusion of the conditioning specified in 4.5.11.2, the specimens which were conditioned at 158°F shall be allowed to cool in air at $73.5^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for 16 to 24 hours before testing for bond strength. The specimens which were conditioned in water at 120°F shall be placed in a fresh portion of cool water, conditioned in water at $73.5^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for a minimum of two hours but not more than four hours and tested for bond strength immediately on removal from the water. The specimens which were immersed in Reference Fuel B of ASTM D 471 at $73.5^{\circ}\text{F} \pm 2^{\circ}\text{F}$ shall be tested for bond strength immediately after the conclusion of the conditioning period specified in 4.5.10.2.

4.5.11.3 Testing for bond strength Bond strength shall be determined at $73.5^{\circ}\text{F} \pm 2^{\circ}\text{F}$. The test specimens shall be placed individually in a tension-testing machine and the force required to separate the two disks measured. The moving head of the machine shall travel at a rate of 0.02 inch per minute. The results obtained

MIL-A-24456(SHIPS)

on each group of three specimens shall be averaged and divided by 2 to give the results in terms of pounds per square inch

4.5.12 Adhesion to damping tile. The bond between the adhesive and the damping tile shall be determined by the procedure given in the following paragraphs

4.5.12.1 Specimen preparation Nine disks, each 4 inches in diameter, shall be cut from a tile in accordance with class 1 of MIL-P-23653. One face of each disk shall be bonded with properly mixed adhesive to a steel disk 3/8 inch thick by 4 inches in diameter which has been cleaned by sandblasting and painted as described in 4.5.11.1. The opposite face of the steel disk shall have a centrally located threaded stud 1/2 inch diameter by 1 inch long. A steel disk, 1.59 inch diameter by 3/8 inch thick, with a threaded stud on one face shall be degreased, cleaned by sandblasting, painted as described in 4.5.11.1 and then bonded with the adhesive in a central position to the opposite face of the tile disk. The adhesive shall be mixed as specified in 4.5.3.1 and then applied to the steel disks only in the same manner as 4.5.11.1. Nine replicate specimens shall be prepared. The assembled specimens shall be kept at ambient room temperature for 16 to 24 hours and then they shall be placed in an air oven at 120°F for 5 days. A drawing of an assembled specimen is shown in figure 2.

4.5.12.2 Conditioning After completion of curing operations, three specimens shall be conditioned in air at 158° ± 2°F for 2 weeks and three specimens shall be conditioned in water at 120° ± 2°F for 2 weeks in the same manner as specified in 4.5.11.2

4.5.12.3 Testing for bond strength Bond strength shall be determined at 73.5° ± 2°F in the same manner as specified in 4.5.11.3 except that the rate of separation of the disk from the specimen shall be 1 inch per minute

4.5.13 Storage life. The manufacturer shall certify and shall support his certification with test data that the adhesive, after being stored in its original unopened container for one year at the temperature specified in 4.5.1.1 shall meet the requirements of this specification

4.6 Inspection of preparation for delivery Preservation, packaging, packing and marking shall be examined to determine conformance with the requirements of section 5 of this specification

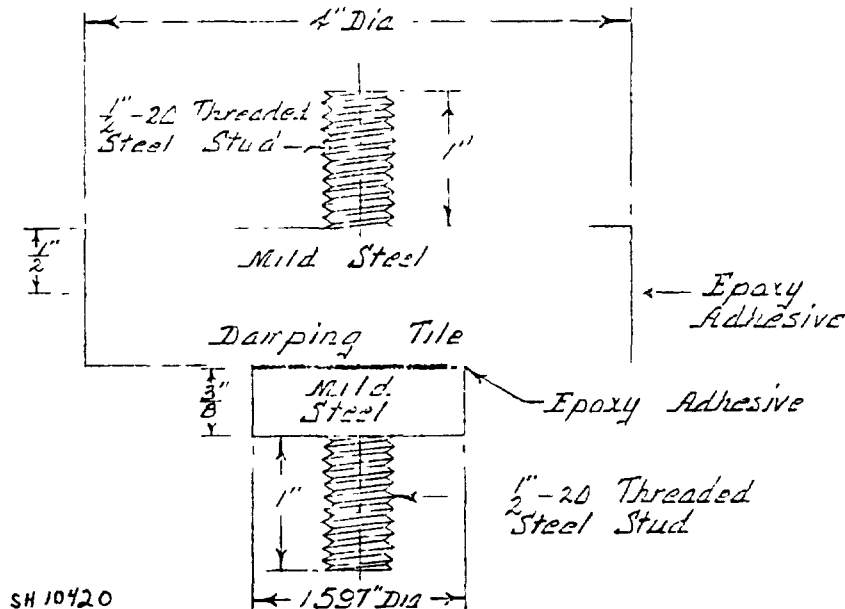


Figure 2 - Test specimen for measuring adhesion to plastic damping tile

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 6.5.)

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2).

5.1.1 The two part adhesive, epoxy base resin and hardener shall be furnished in separate or compartmentized containers and kit packaged. The base resin container in each kit shall have sufficient void to receive and mix the required amount of hardener.

5.1.2 Level A. The base resin shall be furnished in one-quart or one-gallon cans or in five-gallon pails in the quantity specified (see 6.2). The hardener shall be furnished in cans or pails commensurate with the quantity of hardener required.

5.1.2.1 Cans. Cans shall conform to type V, class 2 round of PPP-C-96 with plan B coating and side seam striping required. One gallon cans shall be provided with handles which shall be galvanized or protectively coated to resist corrosion.

5.1.2.2 Pails. Pails shall conform to type II, class 1 of PPP-P-704. Wire handles and bails shall be zinc-coated or otherwise protectively coated to resist corrosion.

5.1.2.3 Compartment type containers. For one-quart and one-gallon size kits, upper compartment (piggy-back) type containers are authorized and shall be of the same diameter and design configuration as the base container. Five-gallon pails shall be furnished with an inner compartment (tray) and shall provide seal integrity to prevent premature mix of the ingredients.

5.1.2.4 Unit protection. One-quart and one-gallon size kits shall be unit protected in a fiberboard box conforming to PPP-B-636, type CF, class weather-resistant with variety and grade at the suppliers option. No additional unit protection is required for five-gallon size kits.

5.1.3 Level C. The adhesive, kit packaged in one-quart, one-gallon or five-gallon sizes, in the quantity specified (see 6.2), shall be packaged in containers to afford protection from deterioration, damage or loss of material during shipment from the supply source to the first using activity for immediate use. The suppliers normal packaging methods may be utilized when such meet the requirements of this level.

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

5.2.1 Level A. Sixteen one-quart or four one-gallon size kits, packaged as specified in 5.1, shall be packed in a fiberboard box conforming to PPP-B-636 class weather resistant, grade V or PPP-B-640 class 2. Boxes shall be closed, waterproofed and reinforced with non-metallic banding or tape as specified in the appendix to the box specification. Five-gallon size kits, packaged as specified in 5.1, will require no further packing.

5.2.2 Level B. Sixteen one-quart or four one-gallon size kits packaged as specified in 5.1 shall be packed in a fiberboard box conforming to PPP-B-636 class - domestic or PPP-B-640 class 1. Box closure shall be in accordance with the appendix to the box specification. Five gallon size kits packaged as specified in 5.1 will require no further packing.

5.2.3 Level C. Kits of adhesive packaged as specified in 5.1 shall be packed in containers acceptable to the common carrier and which will insure safe delivery at destination in a satisfactory condition at the lowest applicable rate. Containers, packing or method of shipment shall comply with Uniform Freight or National Motor Freight Classification Rules or Regulations or other carrier rules as applicable to the mode or transportation.

5.3 Palletized and containerized unit loads. When specified (see 6.2), adhesive packed as specified shall be palletized or containerized in accordance with MIL-STD-147. The unitized load shall be accomplished by strapping. Quantities of packed adhesive too small for accomplishing a unitized load shall be consolidated in shipping containers for the level of packing specified.

5.4 Marking. In addition to the identification marking (see 3.15) or any special marking required by the contract or order (see 6.2), interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.

5.4.1 Hazardous chemicals. All interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-1341. Additional information required by Department of Transportation Regulation CFR Title 49, parts 171-178, and the Manufacturing Chemists Association Manual L-1, shall be included in the markings on the exterior containers.

6. NOTES

6.1 Intended use. The adhesive covered by this specification is intended for use aboard ships to bond plastic vibration damping tiles (MIL-P-23653) to ship structures.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Size of container and quantity desired (see 5.1.2 and 5.1.3)
- (c) Level of packaging and packing required (see 5.1 and 5.2)

MIL-A-24456(SHIPS)

- (d) Palletized, unitized, or containerized load when required (see 5.3).
- (e) Special markings required (see 5.4)

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 24456 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, Prince George's Center, Center Building, Hyattsville, Maryland 20782, 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 6.4).

6.4 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

6.5 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.

Preparing activity:
Navy - SH
(Project 8040-N035)

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).

SPECIFICATION

ORGANIZATION (of submitter)

CITY AND STATE

CONTRACT NO

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

\$

MATERIAL PROCURED UNDER A

☐

DIRECT GOVERNMENT CONTRACT

☐

SUBCONTRACT

1 HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A GIVE PARAGRAPH NUMBER AND WORDING

B RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2 COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3 IS THE SPECIFICATION RESTRICTIVE?

☐ YES☐ NO

IF "YES", IN WHAT WAY?

4 REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity)

DATE

DD FORM 1426
1 APR 63

REPLACES NAVSHIPS FORM 4863 WHICH IS OBSOLETE

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DEPARTMENT OF THE NAVY
Naval Ship Engineering Center
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Prince George's Center
Hyattsville, Maryland 20782

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