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INCH-POUND
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(See 6.8)

MILITARY SPECIFICATION

REPAIR KITS, METALLIC PIPE AND GENERAL PURPOSE, DAMAGE CONTROL

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers repair kits for metallic pipe and general purpose damage control use.

1.2 Classification. Metallic pipe and general purpose damage control kits are furnished as one of the following, as specified (see 6.2):

Kit 1 - Synthetic thermosetting resin and hardener in liquid form with instruction manual, glass cloth, polyvinylchloride (PVC) film, tools, and safety equipment.

Kit 2 - Synthetic thermosetting resin and hardener in paste form with spatulas only.

Kit 3 - Synthetic thermosetting resin and hardener in liquid form only.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, Attn: 05Q42, 2531 National Center, Bldg. 3, Washington, DC 20362-5160 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 4730

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

A-A-1048	- Coated Abrasive Cloth, Aluminum Oxide.
L-P-375	- Plastic Film, Flexible, Vinyl Chloride.
T-T-881	- Twine, Cotton, Seine.
GGG-S-278	- Shears and Scissors.
PPP-C-96	- Cans, Metal, 28 Gauge and Lighter.
PPP-C-186	- Containers, Packaging and Packing for Drugs, Chemicals, and Pharmaceuticals.
PPP-F-320	- Fiberboard: Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

MILITARY

MIL-P-116	- Preservation, Methods of.
MIL-L-19140	- Lumber and Plywood, Fire Retardant Treated.

STANDARDS

FEDERAL

FED-STD-191	- Textile Test Methods.
FED-STD-791	- Lubricants, Liquid fuels, and Related Products; Methods of Testing.
FED-STD-313	- Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities.

MILITARY

MIL-STD-2073-1	- DOD Materiel Procedures for Development and Application of Packaging Requirements.

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

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

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PUBLICATIONS

DEPARTMENT OF LABOR (OSHA)
Code of Federal Regulations (CFR) 29, Part 1910.1000 - Occupational Safety and Health Standards

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
D 3951 - Standard Practice for Commercial Packaging. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specifications, specification sheets or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Repair kits furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time of award of contract (see 4.3 and 6.3).

3.1.1 Material safety data sheet (MSDS). The contracting activity shall be provided a material safety data sheet at the same time of contract award. The MSDS shall be provided in accordance with the requirements of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 6.6).

3.2 Materials. Materials shall be of the highest quality and shall be free from foreign or extraneous matter which might adversely affect the performance characteristics of the resin or reinforcing materials.

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3.3 Contents. The kit shall consist of the items specified for kit 1, 2, or 3 of table I, as specified (see 6.2).

TABLE I. Contents of kits.

Item	Quantity	References
Kit 1		
Resin, liquid	Four cans, 400 grams each	3.3.1
Hardener, liquid	Four containers, 100 grams each	3.3.2
Cloth, glass, woven roving	One piece, 24 by 40 inches	3.3.4
Void cover	One piece, 8 by 36 inches	3.3.5
Film, PVC	One piece, 48 by 60 inches	3.3.6
Paint paddle	Four each	3.3.7
Chalk line	1/8 pound	3.3.8
Abrasive cloth	One sheet, 9 by 11 inches	3.3.9
Scissors	One each	3.3.10
Gloves, polyethylene	Four pairs	3.3.11
Visitor specs	Two each	3.3.12
Kit 2		
Resin, paste	Four cans, 300 grams each	3.4
Hardener, paste	Four cans, 75 grams each	3.4.2
Paint paddle	Four each	3.3.7
Kit 3		
Resin, liquid	Four cans, 400 grams each	3.3.1
Hardener, liquid	Four containers, 100 grams each	3.3.2

3.3.1 Liquid resin. The liquid resin shall be a thermosetting epoxy type material compounded with or without additional filler material, and shall conform to the requirements specified in 3.3.1.1, 3.3.1.2, and 3.3.2.3 through 3.3.2.5.

3.3.1.1 Viscosity of liquid resin. The resin shall have a viscosity of not less than 6000 centipoises (cP) nor greater than 20,000 cP at 73 ± 2 degrees Fahrenheit (°F) as determined by a Brookfield synchro-lectric viscosimeter.

3.3.1.2 Specific gravity of liquid resin. The liquid resin shall have a specific gravity of 1.20 ± 0.15 at 60°F, as determined by weighing a known volume.

3.3.2 Liquid hardener. The hardener shall be a liquid that mixes readily with the resin, reacts as specified in 3.3.3, and conforms to the requirements specified in 3.3.2.1 through 3.3.2.5.

3.3.2.1 Viscosity of liquid hardener. The liquid hardener shall have a viscosity of not greater than 1000 cP at 73 ± 2°F, as determined by a Brookfield synchro-lectric viscosimeter.

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3.3.2.2 Specific gravity of liquid hardener. The liquid hardener shall have a specific gravity of 1.0 ± 0.15 at 60°F, as determined by weighing a known volume.

3.3.2.3 Flash point of liquid hardener and liquid resin. The liquid hardener and liquid resin shall have flash points greater than 250°F as determined by the Cleveland open cup method in accordance with FED-STD-791.

3.3.2.4 Color of liquid hardener and liquid resin. The liquid hardener and liquid resin shall each have a distinctive color and, when thoroughly mixed, shall blend into a third distinctive color within 1-1/2 minutes to indicate that the materials have been homogeneously mixed (see 4.7.2.1).

3.3.2.5 Stability of liquid hardener and liquid resin. The liquid hardener and liquid resin shall be stable for a period of not less than 24 months (see 4.7.2.6).

3.3.3 Performance requirements for liquid resin and liquid hardener. When mixed, the two-component system consisting of liquid resin and liquid hardener shall meet the requirements specified in 3.3.3.1 through 3.3.3.7.

3.3.3.1 Reaction time. The liquid resin and liquid hardener, when mixed, shall become a hard solid mass in not less than 9 minutes and not greater than 15 minutes after combining the two materials (see 4.7.2.2). No external heat shall be needed for initiating the reaction or for curing.

3.3.3.2 Temperature. The temperature of the patch, when applied and measured, shall be not greater than 400°F (see 4.7.2.3).

3.3.3.3 Flammability. Any fumes or vapors resulting from the reaction shall be nonflammable.

3.3.3.4 Ratio. To obtain the proper cure, the prescribed quantitative ratio of liquid resin to liquid hardener shall be an incremental ratio of 1 can (400 grams) liquid resin to 1 can (100 grams) liquid hardener. It shall not be necessary to vary this ratio in order to perform the tests specified herein.

3.3.3.5 Toxic products. The material shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency.

3.3.3.6 Adhesion to steel plate. The average value of the two patches tested to withstand hydrostatic pressure without leaking shall be not less than 1000 pounds per square inch gage (psig) (see 4.7.2.4.2). Values and requirements specified herein, relating to hydrostatic pressure, refer to gauge pressures above atmospheric in pounds per square inch gage.

3.3.3.7 Patches. Each of two straight-line patches prepared as specified in 4.7.2.5.3 shall withstand the following hydrostatic pressures without leaking (see 4.7.2.5.4):

(a) On galvanized metal - 200 psig.
(b) On copper-nickel tubing - 200 psig.

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3.3.4 Reinforcing material. The reinforcing material supplied with kit 1 shall be one of the following types.

3.3.4.1 Glass cloth, woven roven, continuous fiber.

(a) Thickness range (nominal average in accordance with method 5030 of FED-STD-191): 0.070 ± 0.007 inches to 0.120 ± 0.012 inches.
(b) Weight range per square yard average (in accordance with method 5041 of FED-STD-191): 2.0 ± 0.20 pounds (31.6 ounces) to 3.6 ± 0.36 pounds (58.0 ounces).
(c) Yarn (characteristics range):
Wrap - 225 to 250 linear yards per pound.
Fill - 225 to 250 linear yards per pound.
Construction - 4 to 5.25 by 2 to 2.6.
Type of weave - plain.
(d) Finish: Yarn before weaving shall be treated with either an improved finish which is compatible with epoxy resins or with a silane finish for maximum compatibility with epoxy resin systems. The finished woven cloth shall be free from oil spots, grease spots, other contamination, creases, wrinkles, and other forms of permanent distortion or damage, and shall not be brittle or fused.
(e) Warp direction: The pieces of reinforcing cloth shall be cut so that the warp direction is parallel to the longest dimension.

3.3.4.2 Triaxial fabric.

(a) Yarn: E glass fiberglass yarn.
(b) Type of weave: Triaxial.
(c) Warp direction: 0 degrees, -45 degrees, +45 degrees orientation.
(d) Finish: Multi resin compatible and compatible with epoxy resins.
(e) Thickness: (nominal) 0.050 average laminated thickness.
(f) Weight in direction:
0 degrees - 15.36 ounces per square yard (oz/yd^2).
+ 45 degrees - 8.78 oz/yd^2.
- 45 degrees - 8.78 oz/yd^2.
(g) Total weight per square yard: 34.37 oz/yd^2 ± 10 percent.

3.3.5 Void cover. The void cover shall consist of a resin-treated woven glass cloth and shall conform to the following:

(a) Thickness - not less than 0.015 inch nor greater than 0.025 inch.
(b) Hydrostatic resistance - greater than 100 psig (Mullen test).
(c) Tensile strength - warp 250 pounds, filler 250 pounds per linear inch.
(d) Weight - not less than 17 oz/yd^2 nor greater than 19 oz/yd^2.
(e) Sufficiently rigid to prevent loss of shape during application of patches yet bendable on a 1-inch radius at 70°F without cracking.
(f) Good adhesion to resin-activator mixture.

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3.3.6 Film, PVC. The PVC film shall be one piece, 48 inches wide by 60 inches long by 0.0040 ± 0.0004 inch thick, type I, class 1 (colorless) in accordance with L-P-375.

3.3.7 Stirring tool, paint paddle. The paint paddle shall be made of smooth hardwood 5-3/4 inches long by 11/16 inches wide.

3.3.8 Chalk line. The chalk line shall conform to commercial number 18 of T-T-881.

3.3.9 Abrasive cloth. Aluminum oxide abrasive cloth number 80, size 9 by 11 inches conforming to type I, class 1 of A-A-1048 shall be supplied.

3.3.10 Scissors. Scissors shall be in accordance with type I, class 1, style A of GGG-S-278, and shall be 9 inches in length.

3.3.11 Gloves, polyethylene. Gloves shall be made of polyethylene film, 1-3/4 mils thick and 1-1/2 ± 1/2 inches long. Size shall be 10 or 11 large.

3.3.12 Visitor specs. The visitor specs shall be of clear, colorless plastic, and typical commercial quality. They shall have integral side shields and shall satisfactorily fit and function when worn over prescription eye glasses typically in use.

3.4 Paste resin. The paste resin shall be of a thermosetting epoxy type compound with appropriate filler, as specified in 3.4.1 through 3.4.1.2.

3.4.1 Consistency of paste resin. The paste resin shall have a penetration value of 220 to 260 (in 1/10-millimeter (mm) units) when measured as specified in 4.7.3.1.

3.4.1.1 Specific gravity of paste resin. The specific gravity of the paste resin shall be 1.45 ± 0.15 when measured as specified in 4.7.3.5.

3.4.1.2 Stability of paste resin and hardener. The paste resin and paste hardener, when tested, shall be stable for a period of not less than 24 months (see 4.7.3.6).

3.4.2 Performance requirements for paste resin and hardener. The paste resin and paste hardener, when mixed in the proportions supplied in the containers, shall conform to 3.4.3.1 through 3.4.3.3.

3.4.2.1 Consistency of paste hardener. The paste hardener shall have a penetration value of 255 to 295 (in 1/10-mm units) when measured as specified in 4.7.3.1.

3.4.2.2 Specific gravity of paste hardener. The specific gravity of the paste hardener shall be 1.40 ± 0.15 when measured as specified in 4.7.3.5.

3.4.2.3 Flash point of paste hardener and paste resin. The paste hardener and paste resin shall have flash points greater than 250°F as determined by the Cleveland open cup flash point method in accordance with FED-STD-791.

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3.4.2.4 Color of paste hardener and paste resin. The paste hardener (black) when properly mixed with the paste resin (white), will blend into a third distinctive (gray) color to indicate that the materials have been homogeneously mixed.

3.4.3 Reaction time. The paste resin and paste hardener, when mixed as specified, shall react in not less than 13 minutes and not greater than 21 minutes after combining of these materials (see 4.7.3.2). No external heat shall be necessary for initiating the reaction or for curing.

3.4.3.1 Ratio. To obtain the proper cure, the prescribed quantitative ratio of paste resin to paste hardener, shall be an incremental ratio of 1 can (300 grams) paste resin to 1 can (75 grams) paste hardener. It shall not be necessary to vary this ratio in order to perform the tests specified.

3.4.3.2 Adhesion to steel plate. The average of three hydrostatic tests for adhesion to steel plate shall be not less than 1000 psig (see 4.7.3.3).

3.4.3.3 Adhesion to copper-nickel plate. The average of three hydrostatic tests for adhesion to copper-nickel plate shall be not less than 1000 psig (see 4.7.3.4).

4. QUALITY ASSURANCE PROVISIONS

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

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

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) Qualification inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

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4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory satisfactory to NAVSEA. Qualification inspection shall consist of the examination and tests specified in 4.5 and 4.7 .

4.3.1 Samples for qualification inspection. The contractor shall submit samples of the kit or kits for which qualification is desired. The samples shall be as follows:

(a) One complete kit 1, with six additional cans each of liquid resin and hardener.
(b) One complete kit 2, with six additional cans each of paste resin and hardener.

The samples shall be forwarded to a laboratory marked as follows:
"For qualification inspection under MIL-R-17882."

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the examination and tests specified in 4.5 and 4.6.

4.4.1 Lot. Repair kits presented for delivery at one time shall be considered a lot for purposes of quality conformance inspection. Quality conformance inspection shall apply individually to kit 1 or 2 of the repair kit, when either kit 1 or kit 2 is acquired. Quality conformance inspection of kit 1 shall also apply to kit 3.

4.4.2 Sampling for examination. A random sample of repair kits shall be selected from each lot of material offered for examination (see 4.5) as specified in table III.

TABLE III. Sampling for examination.

Number of repair kits in lot	Number of repair kits in sample
15 and under	7
16 to 40	10
41 to 110	15
111 to 300	25
301 to 500	35
501 to 800	50
802 to 1300	75
1301 and over	110

4.4.3 Sampling for quality conformance tests. A random sample of repair kits shall be selected at random from each lot in accordance with table IV for the tests specified in 4.6.

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TABLE IV. Sampling for quality conformance tests.

Number of repair kits in lot	Number of repair kits in sample
40 and under	1
41 to 110	2
111 to 300	3
301 to 500	5
501 to 800	7
801 to 1300	10
1301 and over	15

4.5 Examination. Each of the sample repair kits selected in accordance with 4.4.2 shall be examined to verify compliance with the requirements of this specification not involving tests. Any repair kit in the sample containing one or more defects shall be rejected (see 6.4.1).

4.6 Quality conformance tests. Sample repair kits selected in accordance with 4.4.3 shall be tested as follows:

(a) For kit 1 and kit 3 - see 4.7.2.4 and 4.7.2.5.3.
(b) For kit 2 - see 4.7.3.3 and 4.7.3.4.

Any sample repair kit which fails any test shall be rejected (see 6.4.2).

4.7 Test methods.

4.7.1 Conditioning. Unless otherwise specified herein, tests shall be performed under conditions of room temperature and humidity. Room temperature shall be 23 ± 1 degrees Celsius (°C). Room relative humidity shall be 50 ± 4 percent.

4.7.2 Liquid resin-hardener system (kits 1 and 3).

4.7.2.1 Mixing tests. Four hundred grams of liquid resin and 100 grams of liquid hardener shall be separately adjusted to 73°F. The two items shall then be mixed by hand with a wooden spatula in the resin can at a rate of 100 to 120 turns per minute. The test may be performed as part of 4.7.2.2.

4.7.2.2 Reaction test. After the test specified in 4.7.2.1, the mixture in the can shall be placed on a heat resistant pad. A stopwatch shall be started at the time the hardener is poured into the resin. Reaction time shall be deemed to have been reached when the contents of the can have solidified. Three determinations shall be made and the results averaged.

4.7.2.3 Temperature. A simple straight line patch shall be applied as specified in 4.7.2.5.2. During application an iron-constantan thermocouple shall be placed under the outer layer of glass cloth over the rupture. Using a potentiometer, the temperature shall then be measured during the curing of the patch.

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4.7.2.4 Adhesion to steel plate.

4.7.2.4.1 Apparatus. A 1-foot square steel plate, 3/8- to 1/2-inch thick, with a 1-inch square hole at the center, shall be fabricated with attachments that will permit hydrostatic testing. The weight of the plate assembly shall be between 24 and 32 pounds. The surface of the steel plate to which the patch is applied shall have a finish equivalent in roughness, as measured by a Brush analyzer, to 20 ± 15 microinches root mean square (rms). Before application of the patch, the test surface shall be abraded with number 80 (1/0) garnet abrasive paper. The 1-inch square center hole in the plate shall be closed with a rubber or other suitable insert so that the surface of the insert shall be flush with the test surface.

4.7.2.4.2 Procedure. The patch shall be applied by coating three plies of glass cloth (see 3.3.4), size 4 by 4 inches, with a sufficient amount of activated liquid resin to saturate the cloth. The three plies of glass cloth shall be centered over the 1-inch square hole of the plate. A sheet, 12 by 12 inches, of cellophane or other type of separator film, shall be placed over the patch and taped in place. The plate shall be inverted so that the weight of the plate assembly rests on the patch. The patched test plate shall then be permitted to cure at room temperature, approximately 73°F, for a period of 6 hours. After this curing period, the patch test plate shall be subjected to a hydrostatic test as specified in 4.7.2.5.4.

4.7.2.5 Test patches.

4.7.2.5.1 Materials required for patch. The following materials, in the sizes or amounts listed, shall be used to prepare a patch for laboratory test:

(a) Void cover, one piece, size 2-1/2 inches square with rounded corners having a 1-inch radius (see 3.3.5).
(b) Chalk line (see 3.3.8).
(c) Glass cloth, one piece, 6 inches wide by 33 (see 3.3.4).
(d) Liquid resin, one can - 400 grams (see 3.3.1).
(e) Liquid hardener, one container - 100 grams (see 3.3.2).
(f) Outer wrapping film, one piece, 12 by 18 inches (see 3.3.6).

4.7.2.5.2 Application of patch. Each test patch shall be applied within a period not to exceed 15 minutes. Each patch shall be prepared as follows:

(a) Mix liquid hardener into a can of liquid resin and stir well for 1-1/2 minutes until mixture is homogeneous.
(b) Coat both sides of the void cover with resin-hardener mixture and tie void cover over the hole in pipe using chalk line.
(c) Lay the glass cloth on a flat surface. Pour the resin-hardener mixture over the cloth and, using a spatula, distribute the mixture uniformly over the entire area of the cloth. Apply the resin to only one side of the cloth.
(d) Center the resin-covered glass cloth over the void cover and wrap it around the pipe.

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(e) Wrap the outer wrap film around the entire patch.
(f) Tie the film with chalk line wound in a spiral manner with 1/2-inch spacing between turns. Tie each end of the film securely to prevent loss of resin.

4.7.2.5.3 Straight-line patch. One straight-line patch shall be applied as specified in 4.7.2.5.2 to sections of 2-1/2 inch galvanized steel, and copper-nickel pipe. The pipe shall be dry, cleaned, and abraded with 1/0 sandpaper. The pipe and all patching material shall be adjusted and applied at 73°F. The pipe section to be patched shall be 18 to 24 inches long, and shall have a 1-1/2 inch hole. The patched pipe shall be permitted to cure at room temperature (approximately 73°F).

4.7.2.5.4 Hydrostatic test procedure. Each of the test patches applied as specified in 4.7.2.5.2 shall be tested 60 minutes after pouring the hardener into the resin, without benefit of artificial cooling. The test apparatus shall consist of a pressure testing pump, hand- or power-operated, connected to a source of water. The pump shall provide pressure of at least 2000 psig. The apparatus shall have fittings for attaching the patched pipe for testing. The patch shall be tested by mounting the patched pipe in this test apparatus. The pump and pipe shall be filled with water having a temperature of 40 to 60°F, and the outer end of the pipe shall be closed with a cap or valve. The pump shall be operated to increase the pressure at a rate of approximately 50 psig per second until the patch fails. Failure shall be deemed to have occurred when water leaks from the patch or when the pressure does not increase when the pump is operated at the standard loading rate.

4.7.2.5.4.1 Retest of patches. In the event of a failure in any of the two patches tested for conformance to the requirements of 3.3.3.7, a retest shall be performed. In the retest, two patches shall be applied to a 2-1/2 inch pipe of the same material as that in which the failure occurred. The average hydrostatic pressure which the two patches shall withstand without leaking shall be as follows:

(a) On galvanized steel pipes - 300 psig, minimum.
(b) On copper-nickel tubing - 300 psig, minimum.

4.7.2.6 Stability. The liquid resin and hardener shall be stored in their original containers at a temperature of 125°F for a period of 24 months. Samples of the resin, during and at the end of the storage period, shall be tested for compliance with 3.3.1. Samples of the hardener shall be tested for compliance with 3.3.2. The resin and hardener shall show no separation or precipitation of filler material. The resin and hardener, at the end of the 24-month storage period, shall conform to 3.3.3.

4.7.2.7 Toxicological product formulations. The manufacturer shall provide certification that toluene diisocyanate (TDI) has not been used in the formulation of the liquid or paste resins and hardeners, and that the airborne levels of diphenylmethane diisocyanate (MDI) released during normal use of the liquid or paste resins and hardeners do not exceed 0.02 parts per million (p/m) (or current permissible exposure criteria) ceiling value as stipulated by 29 CFR 1910.1000. This TDI certification shall be provided prior to inclusion of the manufacturer's product on QPL No. 17882 (see 6.3) and award of a contract.

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4.7.2.7.1 Certification that TDI is not present, and the MDI airborne levels shall be made by a board certified industrial hygienist, based upon laboratory results obtained from analytical laboratory accredited by the American Industrial Hygiene Association. The method of sampling and analysis shall be approved by the National Institute for Occupational, Safety, and Health.

4.7.2.7.2 Two types of samples shall be provided, the first shall consist of 100 grams of liquid hardener and 400 grams of liquid resin, the second sample shall consist of 75 grams of paste hardener and 300 grams of paste resin. Sample testing shall consist of mixing the 100 grams of liquid hardener with the 400 grams of liquid resin, and mixing the 75 grams of paste hardener with 300 grams of paste resin.

4.7.2.7.3 A sufficient number of samples shall be taken to document on a statistical basis that the safe exposure limits of MDI do not exceed 0.02 p/m (or current permis-sible exposure criteria) as a ceiling value in the breathing zone. If the level of MDI given off by the liquid resin and hardener samples or the paste resin and hardener samples exceeds the 0.02 p/m (or current permissible exposure criteria) ceiling value in the breathing zone, the liquid resins and hardeners or paste resin and hardener exceeding the exposure limit shall be rejected.

4.7.3 Paste resin hardener system (kit 2).

4.7.3.1 Consistency. The consistency of the paste resin and paste hardener shall be determined by its ability to resist penetration of a weighted cone.

4.7.3.1.1 Apparatus. An apparatus shall be used which will allow the cone to penetrate without appreciable friction and which is calibrated accurately to read in tenths of a millimeter. (For a simplified sketch of a penetration instrument (penetrometer) with cone attached, see method 311.8 of FED-STD-791.)

4.7.3.1.2 Cone. The cone shall be of the size and shape shown on figure 1. The tip and face of the cone shall be highly polished. The cone shall have a total weight of 52.5 grams. The cone and its plunger assembly shall have a total moving weight of 100 grams. If the plunger weighs 47.5 grams, the cone or the cone plus an attached weight shall weigh 52.5 grams.

4.7.3.1.3 Test specimen container. The container for holding the material to be tested shall be a flat-bottomed, cylindrical can approximately 55 ± 4 mm (2-3/16 ± 1/8 inches) in diameter and 35 ± 4 mm (1-3/8 ± 1/8 inches) deep.

4.7.3.1.4 Procedure. The test material shall be packed into the test specimen container until flush with the top. A straight edge shall be drawn across the surface of the sample to remove any excess material and present a smooth surface. The container and test material shall be centered beneath the penetrometer cone and assembly. The apparatus shall be leveled, and the plunger lowered until the tip of the penetrometer cone just touches the sample surface. Watching the shadow of the tip aids in accurately setting the cone. The scale

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shall then be adjusted so that the scale activating device is in contact with the top of the rod holding the penetrometer cone, and the scale reading shall be recorded. The plunger shall be released suddenly and kept released for 5 seconds. The scale-activating device shall be moved until it is again in contact with the top of the rod holding the penetrometer cone, and the scale reading shall be recorded. The penetration, in millimeters, is the difference between the scale readings. Three tests shall be made and the average recorded. The sample shall be smoothed over before each test. After each penetration, the cone shall be carefully cleaned to remove all adhering material.

4.7.3.2 Reaction time. The contents of a can of paste hardener, 75 grams, shall be combined with the contents of a can of paste resin, 300 grams and the two shall be well mixed together. The paste resin and hardener shall be mixed in the can or mixed externally and then transferred to the can. Total time of mixing and transfer shall not exceed 5 minutes. The time between the original combining of resin and hardener and the time that the mixture hardens so that it can no longer be stirred shall be recorded as the reaction time. Three determinations shall be made and the results averaged.

4.7.3.3 Adhesion to steel plate.

4.7.3.3.1 Apparatus. The test assembly shall be as specified in 4.7.2.4.1.

4.7.3.3.2 Procedure. One can of paste resin and hardener shall be mixed well, and the resin-hardener mixture shall be used to form a patch 4 inches square and 1 inch thick, centered over the 1-inch square hole in the steel plate. A frame of wood or other suitable material may be used to assist in application and positioning of the patch. The patch, in place on the test apparatus, shall be permitted to cure at room temperature for a period of 2 hours. After this curing period, the patch shall be tested hydrostatically in accordance with 4.7.3.3.3.

4.7.3.3.3 Hydrostatic test. The test apparatus shall consist of a pressure testing pump connected to a source of water. The pump shall be fitted with suitable gauges and shall provide pressures of at least 2000 psig. The apparatus shall have fittings for attaching the patched plate for testing. The patch shall be tested by mounting the patched plate in the test apparatus. The pump and lines leading to the patched plate shall be filled with water having a temperature of 40 to 60°F. The pump shall be operated to increase the pressure at a rate of approximately 50 lb/in^2 per second until the patch fails. Failure shall be deemed to have occurred when water leaks from the patch.

4.7.3.4 Adhesion to copper-nickel plate.

4.7.3.4.1 Apparatus. A 1/4-inch thick 8-inch square piece of 70-30 copper-nickel plate (70 percent copper - 30 percent nickel) with a 1-inch square hole at the center shall be fabricated with attachments that will permit hydrostatic testing. The weight of the total assembly shall be between 6 and 10 pounds. The surface of the copper-nickel plate to which the patch is applied shall have a finish equivalent in roughness, as measured by a surface analyzer, to 20 $\pm$ 15 microinches rms. Before application of the patch, the test surface shall be abraded with number 80 (1/0) garnet abrasive paper. The 1-inch square center hole in the plate shall be closed with a rubber or other suitable insert.

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4.7.3.4.2 Procedure. The procedure for making and testing a patch on the copper-nickel test jig shall be the same as specified for a patch on a steel plate in 4.7.3.3.2, except that the patch on copper-nickel plate shall be 1/2-inch thick instead of 1-inch thick. One can each of paste resin and hardener may be used for making patches on two copper-nickel plates.

4.7.3.5 Specific gravity. The specific gravity of the paste resin and hardener may be determined by a pycnometer or other suitable means.

4.7.3.6 Stability. The paste resin and paste hardener shall be stored in their original containers at a temperature of 125°F for a period of 24 months. Samples of the resin, during and at the end of the storage period, shall be tested to determine conformance to 3.4.1. Samples of the hardener shall be tested to determine conformance to 3.4.2. The resin and hardener shall show no substantial separation of liquid from the filler material. The resin and hardener, at the end of the 24-month storage period, shall conform to the requirements of 3.4.2.

4.8 Inspection of packaging. Sample packages and the inspection of the packaging, preservation, packing, and marking for shipment, stowage, and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 General.

5.1.1 Performance oriented packaging (POP). In addition to the packaging requirements specified herein and unless otherwise specified (see 6.2), all packaging shall comply with the United Nations POP requirements.

5.1.2 Navy fire-retardant requirements.

(a) Lumber and plywood. Unless otherwise specified (see 6.2), all lumber and plywood including laminated veneer materials used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated materials conforming to MIL-L-19140 as follows:

Level A and B - Type II - Weather resistant.
Category 1 - General use.
Level C - Type I - Non-weather resistant.
Category 1 - General use.

(b) Fiberboard. Fiberboard used in the construction of interior (unit and intermediate) and exterior fiberboard boxes including interior packaging forms shall conform to the class domestic/fire retardant or class-weather resistant/fire retardant materials equipment as specified (see 6.2), of PPP-F-320 and amendments thereto.

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(c) Cushioning and wrapping materials. The use of excelsior, newspaper, shredded paper (all types), and similar hydroscopic or non-neutral material and all types of loose fill materials for packaging applications such as cushioning and wrapping shall have properties (characteristics) for resistance to fire (see 6.5). Cushioning or wrapping materials, as applicable, shall be provided to prevent item and package damage and to prevent free movement of the container contents.

5.2 Preservation. Preservation shall be level A, C, or commercial, as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 Kit 1. Quantities shall be as specified in table I.

5.2.1.1.1 Liquid resin. Liquid resin shall be furnished in pint cans conforming to type V, class 2 of PPP-C-96. Seaming compound shall not be used. Exterior plan B coating and side seam stripping shall be required.

5.2.1.1.2 Liquid hardener. Liquid hardener shall be furnished in bottles conforming to group A, class 1, type E of PPP-C-186, with closure B and seal A applicable, and the glass shall be clear. The lining material shall not affect or be affected by the hardener. After filling of containers, caps shall have tension applied so as to seal the containers against leakage during handling, shipment, and storage.

Each bottle shall be cushioned (see 5.1.2(c) and individually packaged in a snug-fitting "water resistant, folding, set-up, or metal-edged paperboard or a class-weather resistant/fire retardant fiberboard (see 5.1.2(b)) box meeting the unit and intermediate container requirements of MIL-STD-2073-1". Unless otherwise specified (see 6.2), box selection shall be at the option of the contractor. Box closure shall be as specified in the applicable box specification or appendix thereto, with method V closure applicable to fiberboard boxes.

5.2.1.1.3 Glass cloth. The glass cloth shall be individually wrapped in neutral kraft paper (see 5.1.2(c)) and secured with pressure sensitive tape.

5.2.1.1.4 Void cover. The void cover shall be rolled into the form of a cylinder and secured with pressure-sensitive tape.

5.2.1.1.5 Separating film. The separating film shall be folded to a minimum practicable size and secured by taping, tying, or other suitable means.

5.2.1.1.6 Stirring tool, paint paddle. The paint paddles shall be bundled and secured by tying, taping, or other suitable means.

5.2.1.1.7 Chalk line. The chalk line shall be wound on a spool having 2-1/2 inch diameter sides made of 130 posted chipboard of good quality, 1/8-inch thick.

5.2.1.1.8 Abrasive cloth. The abrasive cloth shall be packaged in a kraft paper envelope (see 5.1.2(c)).

the applicable drawings are in conflict with this specification.

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5.2.1.1.9 Scissors. Scissors shall be wrapped in either neutral kraft paper, sealed with adhesive or tape, or unit packed in clear plastic, heat or pressure fit sealed enclosure.

5.2.1.1.10 Gloves. The polyethylene gloves shall be wrapped in either neutral kraft paper or unit packed in clear plastic, heat or pressure fit sealed enclosure.

5.2.1.1.11 Visitor specs. The visitor specs shall be wrapped in either neutral kraft paper sealed with adhesive or tape, or unit packed in clear plastic, heat or pressure fit sealed enclosure.

5.2.1.2 Kit 2. Quantities shall be as specified in table I.

5.2.1.2.1 Paste resin and paste hardener. Paste resin and paste hardener shall be packaged separately in cans conforming to type VI of PPP-C-96. Cans shall be finished to resist corrosion, but in no case shall contain a finish that may react with or be injurious to either the resin or hardener. The resin can shall provide sufficient excess space to permit the hardener to be added and conveniently mixed. Cans shall be sealed with slip cover lids.

5.2.1.2.2 Stirring tool, paint paddle. The paint paddles shall be bundled and secured by tying, taping, or other suitable means.

5.2.1.3 Kit 3. Quantities shall be as specified in table I and packaged as specified in 5.2.1.1.1 and 5.2.1.1.2.

5.2.1.3.1 Resin and hardener. The resin and hardener shall be unit packed in containers as specified in 5.2.1.1.1 and 5.2.1.1.2 and requirements therein.

5.2.1.4 Unit packaging. The component parts of each kit as specified in 5.2.1.1, 5.2.1.2, and 5.2.1.3 shall be unit packaged as a kit in a fiberboard box meeting the requirements specified in 5.2.1.1.2. Boxes shall have separators, partitions, cells, or similar media to provide a compact nonshifting load and to prevent damage from movement within the kit container.

5.2.1.5 Instructions. One copy of "Instructions for Use of Repair Kits, Metallic Pipe and General Purpose Damage Control" shall be placed in each unit container (see 5.2.1.4), located for ease of accessibility when the container is opened. The instructions shall be packaged in a transparent waterproof plastic bag, not less than 4 mils thick in accordance with MIL-P-116. Bag closure shall be by heat sealing.

5.2.2 Level C. Preservation of items and assemblies shall be as specified under level A except as follows:

(a) Cans - Exterior plan A coating shall apply in lieu of plan B.
(b) The paperboard containers shall be of the domestic or non-weather resistant type, class, or variety as applicable.
(c) The fiberboard containers shall be of the class-domestic/fire-retardant material (see 5.1.2(b)). The box closure shall be in accordance with method I using pressure sensitive adhesive tape.

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5.2.3 Commercial. Commercial preservation of repair kits shall be in accordance with ASTM D 3951.

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

5.3.1 General requirements for levels A, B, and C. Containers selected (see 5.3.1.1) shall be of minimum weight and cube consistent with the protection required, of uniform size, and contain identical quantities of identical material.

5.3.1.1 Levels A, B, and C containers. Material preserved as specified (see 5.2) shall be packed in exterior shipping containers, for the level of packing specified (see 5.3), in accordance with MIL-STD-2073-1, and herein. Unless otherwise specified (see 6.2), container selection shall be at the contractor's option.

5.3.1.1.1 Caseliners, closure, and gross weight.

5.3.1.1.1.1 Caseliners. Unless otherwise specified (see 6.2), level A shipping containers containing material preserved level C or commercial shall be provided with waterproof caseliners in accordance with MIL-STD-2073-1.

5.3.1.1.1.2 Closure. Container closure, reinforcing, or banding shall be in accordance with the applicable container specification or appendix thereto except the weather-resistant or weather-resistant/fire retardant fiberboard boxes shall be closed in accordance with method V and reinforced with non-metallic or tape banding, and domestic/fire retardant fiberboard boxes shall be closed in accordance with method I using pressure sensitive tape.

5.3.1.1.1.3 Weight. Wood, plywood, and cleated type containers exceeding 200 pounds gross weight shall be modified by the addition of skids in accordance with MIL-STD-2073-1 and the applicable container specification or appendix thereto.

5.3.2 Commercial. Material preserved as specified (see 5.2) shall be packed for shipment in accordance with ASTM D 3951 and herein.

5.3.2.1 Container modification. Shipping containers exceeding 200 pounds gross weight shall have a minimum of two, 3-inch by 4-inch nominal wood skids laid flat, or a skid or sill type base which will support the material and facilitate handling equipment during shipment, stowage, and storage.

5.4 Marking. In addition to any special marking required (see 6.2), or herein, unit packs, shipping containers, and pallet unit loads shall be marked in accordance with MIL-STD-2073-1 and the implemented specifications. Commercial (preservation and packing) packs shall be marked in accordance with ASTM D 3951 including bar coding (see MIL-STD-2073-1),

5.4.1 Special markings. Containers shall be marked as specified in 5.4.1.1 through 5.4.1.4. Quotation marks used herein to indicate the wording of the labels shall not appear on the labels themselves.

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5.4.1.1 Labeling of liquid resin container. The following information shall be provided on a durable printed label:

"Liquid Epoxy Resin for Repair Kit, Metallic Pipe and
General Purpose, Damage Control
Storage life at 125°F - 24 months.
CAUTION: Do not mix hardener and resin together until actually ready to use. Use only with liquid hardener provided in this kit.
WARNING: May cause skin irritation.
Vapor harmful.
Avoid exposure to vapor. Use respirator, if adequate ventilation is not available.
Avoid contact with the skin or eyes. Use protective clothing, gloves and visitors specs. In case of accidental contact, promptly flush skin or eyes with plenty of water for 15 minutes; for eyes, get medical attention.
DO NOT DISPOSE OF EMPTY CONTAINER AT SEA."

5.4.1.2 Labeling for paste resin container. The following information shall be provided on a durable printed label:

"Paste Epoxy Resin for Repair Kit, Metallic Pipe and
General Purpose, Damage Control
Storage life at 125°F - 24 months.
CAUTION: Do not mix hardener and resin together until actually ready to use. Use only with paste hardener provided in this kit.
WARNING: May cause skin irritation.
Vapor harmful.
Avoid exposure to vapor. Use respirator, if adequate ventilation is not available.
Avoid contact with the skin or eyes. Use protective clothing, gloves and visitors specs. In case of accidental contact, promptly flush skin or eyes with plenty of water for 15 minutes; for eyes, get medical attention.
DO NOT DISPOSE OF EMPTY CONTAINER AT SEA."

5.4.1.3 Labeling of liquid hardener container. The following information shall be provided on a durable printed label:

"Liquid Hardener for Liquid Epoxy Resin.
Storage life at 125°F - 24 months.
CAUTION: Do not mix hardener and resin together until actually ready to use. Use only with liquid epoxy resin provided in this kit.
WARNING: May cause skin irritation.
Vapor harmful.
Avoid exposure to vapor. Use respirator, if adequate ventilation is not available.
Avoid contact with the skin or eyes. Use protective clothing, gloves and visitors specs. In case of accidental contact, promptly flush skin or eyes with plenty of water for 15 minutes; for eyes, get medical attention.
DO NOT DISPOSE OF EMPTY CONTAINER AT SEA."

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5.4.1.4 Labeling for paste hardener container. The following information shall be provided on a durable printed label:

"Paste Hardener for Paste Resin.
Storage life at 125°F - 24 months.
CAUTION: Do not mix hardener and resin together until actually ready to use. Use only with paste epoxy resin provided in this kit.
WARNING: May cause skin irritation.
Vapor harmful.
Avoid exposure to vapor. Use respirator, if adequate ventilation is not available.
Avoid contact with the skin or eyes. Use protective clothing, gloves and visitors specs. In case of accidental contact, promptly flush skin or eyes with plenty of water for 15 minutes; for eyes, get medical attention.

The entire contents of this container of hardener shall be mixed with the paste resin in the resin can, or may be used proportionately, 4 parts of resin to 1 part of hardener. DO NOT DISPOSE OF EMPTY CONTAINER AT SEA."

5.4.5 Marking of kits.

5.4.5.1 Kit-1. Each carton containing kit-1 materials shall be marked with the following information:

"Kit-1.
Contains liquid resin and associated materials for Repair Kit, Metallic Pipe and General Purpose, Damage Control.
Store in a cool place.
Storage life at 125°F - 24 months.
Lot number."

5.4.5.2 Kit-2. Each carton containing kit-2 materials shall be marked with the following information:

"Kit-2.
Contains paste resin and associated materials for Repair Kit, Metallic Pipe and General Purpose, Damage Control.
Store in cool place.
Storage life at 125°F - 24 months.
Lot number."

5.4.5.3 Kit-3. Each carton containing kit-3 materials shall be marked with the following information:

"Kit-3.
Contains liquid resin and liquid hardener for Repair Kit, Metallic Pipe and General Purpose, Damage Control.
Store in a cool dry place.
Storage life at 125°F - 24 months.
Lot number."

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5.5 Material Safety Data Sheet (MSDS). A copy of the MSDS shall be attached to the shipping document for each destination (see 3.1.1 and 6.6).

6. NOTES

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

6.1 Intended use. The repair kits covered by this specification are intended for making repairs to metallic piping systems and other types of metallic and nonmetallic structures. Kit-1 is used primarily for patching piping systems, and kit-2 is used primarily for patching small holes and cracks (less than 1-inch diameter) in metallic and nonmetallic structures. Kit-3 provides an option to purchase the resin and hardener in liquid form only.

6.2 Acquisition requirements. Acquisition documents must specify the following:

(a) Title, number, and date of this specification.
(b) Assembly number required (see 1.2 and 3.3).
(c) Issue of DoDISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
(d) Record of MDI and TDI tests and certification, and Material Safety Data Sheets (MSDS) (see 4.7.2.7).
(e) When POP requirements are not required (see 5.1.1).
(f) When fire-retardant lumber and plywood is not required (see 5.1.2(a)).
(g) Class or fire-retardant fiberboard required (see 5.1.2(b)).
(h) Levels of packaging required (see 5.2 and 5.3).
(i) Container selection if other than contractors option (see 5.2.1.1.2 and 5.3.1.1).
(j) When caseliners are not required (see 5.3.1.1.1.1).
(k) Special marking, if required (see 5.4).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No. 17882 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, SEA 05Q22, 2531 National Center, Bldg. 3, Washington, DC 20362-5160 and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests must 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 Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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6.4 Acceptable quality levels (AQLs) and lot rejection.

6.4.1 AQLs for quality conformance examination. If the number of defective repair kits in any sample (see 4.4.2) exceeds the acceptance number for that sample, the lot represented by the sample is subject to rejection (see table V).

TABLE V. AQLs for quality conformance examination. 1/

Acceptance number (defective)	Rejection number (defective)
0	1
0	1
0	1
1	2
1	2
2	3
3	4
4	5

1/ AQL = 1.5 percent.

6.4.2 AQLs for quality conformance tests. If the number of nonconforming repair kits in any sample (see 4.4.3) exceeds the acceptance number for that sample, the lot represented by the sample is subject to rejection (see table VI).

TABLE VI. AQLs for quality conformance tests.

Acceptance number	Rejection number
Number of repair kits nonconforming in any lot	
0	1
0	1
0	1
0	1
0	1
0	1
1	2

6.5 Cushioning and wrapping materials. Materials having properties for resistance to fire and acceptable for use within interior (unit and intermediate) packs and shipping containers for Navy acquisitions (see 5.1.2(c)) are:

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Material	Specification
Cushioning material, plastic open cell	A-A-440
Paper kraft, treated (fire-resistant)	A-A-1894
Paper, kraft, wrapping	UU-P-268, type III, grade C or D
Fiberboard	PPP-F-320, see 5.1.2(b)
Plastic film, flexible, cellular	PPP-C-795, class 3 fire-retardant
Polystyrene expanded, resilient	PPP-C-850, grade SE
Plastic, open cell, cushioning	PPP-C-1842, type 1, style B
Bound fiber	PPP-C-1120, class A, grade 1, type optional
Rubber, latex foam	MIL-R-5001, grade A
Rubber, cellular	MIL-R-6130, grade A
Fibrous glass	MIL-C-17435
Polystyrene foam	MIL-P-19644, type II
Rubber, cellular, synthetic	MIL-R-20092, class 5
Polyurethane foam	MIL-P-26514
Cushioning, Resilient type, general	MIL-C-26861
Polyurethane foam, flexible open cell	MIL-F-81334
Foam-in-place packaging materials general specification for	MIL-F-83671
Foam, combustion, retardant for cushioning supply items aboard navy ships	MIL-F-87090 (SA)

6.6 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.7 Subject term (key word) listing.

Liquid hardener
Liquid resin
Patches
Reaction time
Void cover

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6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - ME
Navy - SH

Review activities:
Army - MD
DSA - CS

Preparing activity:
Navy - SH
(Project 4730-0114)

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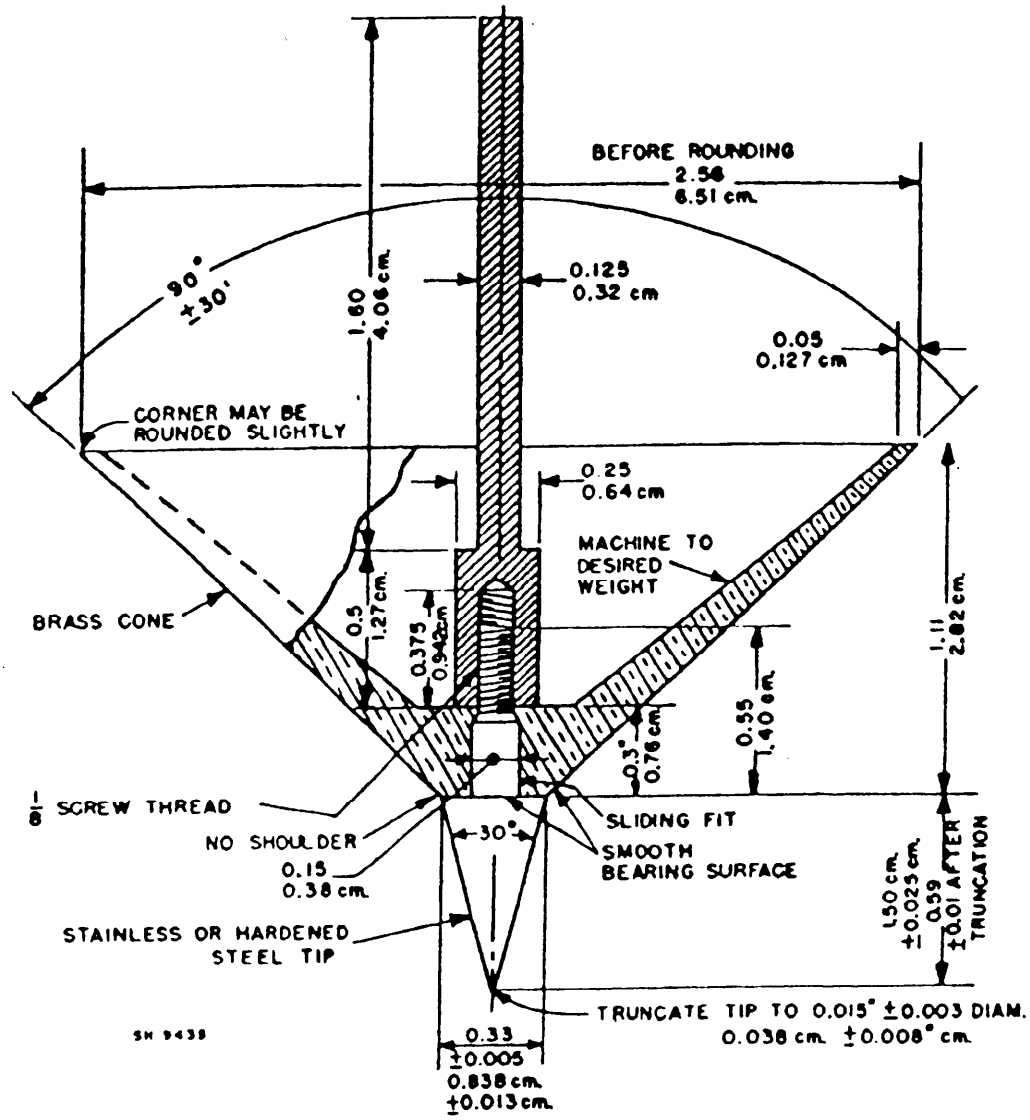

FIGURE 1. Cone for consistency measurement.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-R-17882E	1993 January 6

3. DOCUMENT TITLE
REPAIR KITS, METALLIC PIPE AND GENERAL PURPOSE, DAMAGE CONTROL

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)	
TECHNICAL ENGINEER: Mr. Charles Grotenroth, NAVSEA 05G1	(1) Commercial (703) 602-7217	(2) AUTOVON 332-7217
c. ADDRESS (Include Zip Code) Commander, Naval Sea Systems Command ATTN: SEA 05Q42, 2531 National Ctr.,Bldg 3 Washington, DC 20362-5160	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	