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MIL-B-24781(SH)
4 January 1993

MILITARY SPECIFICATION

BATTERBOARD SYSTEM, SYNTHETIC

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

1. SCOPE

1.1 Scope. This specification covers the requirements and tests for a synthetic batterboard system (batterboard panels and all installation hardware) suitable for application on the well deck bulkheads of amphibious ships.

1.2 Classification. Synthetic batterboards shall be fabricated into panel configurations and shall utilize either sandwich (layered) or homogeneous construction.

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 specification 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).

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

MIL-B-24781(SH)**SPECIFICATIONS****FEDERAL**

- TT-E-489 - Enamel, Alkyd, Gloss, Low VOC Content

MILITARY

- MIL-P-116 - Preservation, Methods of
 MIL-S-1222 - Studs, Bolts, Hex Cap Screws, Socket Head Cap Screws and Nuts
 MIL-T-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5
 MIL-L-7808 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
 MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated
 MIL-H-19457 - Hydraulic Fluid, Fire-Resistant, Non-Neurologic
 MIL-S-24149 - Studs, Welding and Arc Shields (Ferrules), General Specification for
 MIL-F-24385 - Fire Extinguishing Agent, Aqueous Film-Forming Foam (AFFF) Liquid Concentrate, for Fresh and Seawater
 MIL-N-25027 - Nut, Self-locking, 250 Deg. F, 450 Deg. F, 800 Deg. F

STANDARDS**FEDERAL**

- FED-STD-141 - Paint, Varnish, Lacquer, and Related Materials; Methods for Sampling and Testing
 FED-STD-313 - Material Safety Data Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

MILITARY

- MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts
 MIL-STD-810 - Environmental Test Methods and Engineering Guidelines
 MS17830 - Nut, Self-locking Hexagon, Regular Height, 250°F, Non-Metallic Insert, CRES
 MIL-STD-2073-1 - DOD Material Procedures for Development and Application of Packaging Requirements

(Unless otherwise indicated, copies of the federal and military specifications and standards are available from the Standardization Documents Order Desk, Building 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 specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation (see 6.2):

MIL-B-24781(SH)

PUBLICATIONS

**US Department of Health and Human Services
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health (NIOSH)**

NIOSH Pocket Guide to Chemical Hazards, Publication No. 90-117

(Application for copies should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.)

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA)

**Federal Motor Vehicle Safety Standard No. 301 - Fuel System
Integrity
Laboratory Test Procedure for Federal Motor Vehicle Safety
Standard (FMVSS) No. 301**

(Application for copies should be addressed to the Office of Vehicle Safety Compliance, Room 6115, NEF-30, 400 Seventh Street, SW, Washington, DC 20590.)

2.2 Non-Government publications. The following documents 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 256 - Standard Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials**
- D 395 - Test Methods for Rubber Property - Compression Set**
- D 543 - Standard Test Method for Resistance of Plastics to Chemical Reagents**
- D 570 - Standard Test Methods for Water Absorption of Plastics**
- D 1242 - Standard Test Methods for Resistance of Plastic Materials to Abrasion**
- D 1894 - Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheet**
- D 3951 - Standard Practice for Commercial Packaging (DOD adopted)**
- D 4727 - Standard Specification for Corrugated and Solid Fiber-Board Sheet Stock (Container Grade) and Cut Shapes**
- E 162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source**
- E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials**
- E 800 - Standard Guide for Measurement of Gases Present or Generated During Fires**

MIL-B-24781(SH)

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

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE J972 - Moving Rigid Barrier Collision Tests.

(Application for copies should be addressed to: Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

(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, 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 First Article. When specified (see 6.2), a sample of the synthetic batterboard panel shall be subjected to first article inspection (see 6.4) in accordance with 4.3. Unless otherwise specified, first article inspection shall also be required when a new lot is declared (see 4.3.1).

3.2 Material Safety Data Sheets (MSDS). The contracting activity shall be provided a Material Safety Data Sheet for each of the individual materials that combine to make the synthetic batterboard panel at the time of the 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 batterboards covered by this specification (see 6.6).

3.3 Material. Materials used in the construction of the synthetic batterboard system shall meet the requirements as specified herein (see 4.6).

3.3.1 Construction. The synthetic batterboard panel shall be fabricated utilizing either a sandwich-type construction, whereby different layers of materials are combined together, or a homogeneous-type construction, whereby a single material is used alone. If a homogeneous-type construction is used, at least 50 percent of the outer layer shall be backed by an energy absorbing elastomer, as shown on configuration control drawings provided by the contracting officer. If a sandwich-type construction is used, at least one layer shall be an energy absorbing elastomer, as shown on the configuration control drawings. The use of additives or fillers is acceptable to achieve the required properties listed herein.

3.3.1.1 Structural integrity. The synthetic batterboard panel shall not delaminate, splinter, crack, peel, or spall when subjected to the test criteria of 4.6, such that it is unable to meet the impact requirement specified in 3.4, or any other performance requirement as specified herein. Damage beyond a minor surface scuff or gouge greater than 0.25 inches in depth across the batterboard surface shall not be allowed. Minor surface damage shall not cause a loss of panel structural integrity.

MIL-B-24781(SH)

3.3.1.2 Panel dimensions. For the LHA, LHD, LPD and LSD class amphibious ships, the overall thickness of a synthetic batterboard panel shall not diminish the width or length of the well deck area, when compared to the existing wooden batterboard system installation. Length, width and thickness dimensions of the individual batterboard panels shall be as shown on the configuration control drawings provided by the contracting officer.

3.3.1.2.1 Panel tolerances. Production tolerances on the overall length and width of the synthetic batterboard panel shall be not greater than plus or minus 0.50 inch, and not greater than plus or minus 0.125 inch for batterboard panel thickness.

3.3.1.2.2 Attachment tolerances. Tolerances on fastening hardware holes shall take into account the thermal expansion or contraction of the synthetic batterboard panel material(s), within the temperature range specified in 3.3.6, so as to eliminate any batterboard panel buckling or binding problems that might occur during the service life of the panel.

3.3.1.3 Dry weight. Unless otherwise specified (see 6.2), the assembled synthetic batterboard system (batterboard panel and all installation hardware) weight shall be not greater than:

- (a) 20.0 pounds per square foot, for a 3.5-inch thick batterboard panel
- (b) 22.0 pounds per square foot, for a 7.0-inch thick batterboard panel
- (c) 34.0 pounds per square foot, for a 14.0-inch thick batterboard panel.

A Certificate of Technical Data Conformity shall be required for this requirement (see appendix B, section 30).

3.3.2 Corrosion. The synthetic batterboard panel shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, as identified within this specification.

3.3.3 Toxic products and formulations. The synthetic batterboard panel material(s) and associated hardware 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 activity. Regardless of any other requirements, materials and parts containing asbestos, mercury, lead, cadmium, chlorofluorocarbons (CFCs), and vinyl chlorides shall not be used.

3.3.4 Surface coatings to retard burning. Surface coatings on the synthetic batterboard panel, used to retard burning, shall not be used.

3.3.5 Physical properties. All synthetic batterboard materials shall meet all of the requirements specified in table i, when tested in accordance with the listed test procedures.

MIL-B-24781(SH)

TABLE I. Physical properties of batterboard materials.

Properties	Units	Requirement	Test Procedure	First Article	
				Test	Certification ^{1/}
Water absorption	Percent (maximum)	1.0	4.6.1.1		X
Flammability · Flame spread · Smoke generation	Is (maximum) Maximum flame spread index	25	4.6.2	X	
	Dm (maximum) Maximum specific optical density	300	4.6.3	X	X
Chemical resistance · Firefighting fluid · Hydraulic fluid · Aviation fuel · Lubricant	Percent increase in weight and dimensions (maximum)	0.5 wt/0.1 dim. 0.5 wt/0.1 dim. 0.5 wt/0.1 dim. 0.5 wt/0.1 dim.	4.6.4.1	X	
			4.6.4.2	X	
			4.6.4.3	X	
			4.6.4.4	X	
Paintability		adhesion	4.6.5		X
Compression set	Percent	<15	4.6.6	X	
Impact	Maximum deflection (in.)	3.0-in. Depth	4.6.7	X	
Coefficient of friction	Maximum	0.2	4.6.8	X	
Abrasion resistance	Volume loss (percent)	<5 percent of original	4.6.9	X	
Impact requirement at temperature extremes	ft-lb/in.	(see 3.4.1)	4.6.10		X
Fungus resistance		none permitted	4.6.11		X
Electrical insulation resistance	Megohms	50	4.6.12		X
^{1/} A Certificate of Technical Data Conformity shall be required for these requirements.					

MIL-B-24781(SH)

3.3.6 Service temperature. The synthetic batterboard material(s) shall meet all of the requirements specified herein over a normal operating temperature range of -20.0 degrees F to +150.0 degrees F (-28.9°C to +65.6°C). The batterboard panel surface facing into the well deck shall also be capable of withstanding brief excursions, not to exceed 2.0 minutes, at a +220.0 degrees F (+104.4°C) surface temperature while meeting all of the requirements specified herein. A Certificate of Technical Data Conformity shall be required for this requirement (see appendix B, section 30).

3.4 Impact. The maximum deflection of the synthetic batterboard panel, when subjected to the hinged panel test requirement of 4.6.7, shall be not greater than 3.0 inches in depth at any time during the impact test (see figure 1, appendix A). The batterboard panel shall maintain its structural integrity (see 3.3.1.1), such that it is able to absorb additional impacts at this energy level and at the same location. The batterboard panel shall not loosen from its mounted position, nor shall any batterboard fastening hardware (see 3.5.3) fail due to the impact.

3.4.1 Impact requirement at temperature extremes. Synthetic batterboard specimens shall be tested at three temperature conditions, using the Izod test procedure specified in 4.6.10. A baseline Izod value shall be established when tested at +75 degrees F (+23.9°C). A reduction in Izod value, as determined by testing at the lower and higher temperature extremes (see 4.6.10), shall not exceed five percent of the baseline value.

3.5 Installation requirements. The synthetic batterboard panel shall be capable of being attached directly to the ship's bulkhead using welded studs or installed in the existing batterboard hinged metal support structures (hinged or nonhinged). For the LHA, LHD, LPD and LSD Class amphibious ships, the overall thickness of a synthetic batterboard panel shall not diminish the width or length of the well deck area, when compared to the existing wooden batterboard system installation. Length, width and thickness dimensions of the individual batterboard panels shall be as shown on the configuration control drawings provided by the contracting officer. Fasteners shall be sufficiently recessed below the face of the batterboard panel to prevent damage to landing craft in the well. The batterboard panels shall be installed with a maximum 1.0-inch gap between each panel, to allow for water drainage and any panel thermal expansion that may occur within the temperature range specified in 3.3.6.

3.5.1 Cutting, machining, and drilling. The synthetic batterboard panel shall be capable of being cut or machined from its original length and width dimensions to any smaller dimension or shape, or drilled as needed to meet the installation requirements specified in 3.5.

3.5.2 Fasteners and hardware. All screws, studs, bolts, washers, and nuts, used for batterboard panel installation shall be of corrosion-resistant steel Grades 316 or 304, as specified in MIL-S-24149, MIL-N-25027, MS17830 and MIL-S-1222. No mechanical energy absorption devices, such as springs or Belleville washers, shall be used in the synthetic batterboard system assembly.

3.6 Maintenance. Maintenance of the synthetic batterboard panels shall be limited to a washdown procedure using a mild cleaning solution followed by a water rinse. Any marine growth or other contaminants shall be capable of being removed using this procedure. The cleaning solution shall have no adverse effect on the batterboards. A Certificate of Technical Data Conformity shall be required for this requirement (see appendix B, section 30).

MIL-B-24781(SH)

3.6.1 System repairability. The ship's force shall be capable of performing field repairs to synthetic batterboard systems without specialized training or the use of specialized equipment. Repairs shall be limited to replacement of damaged batterboard panels without modification of existing mounting arrangement or hardware.

3.7 Color and paintability. The synthetic batterboard panel shall be capable of being painted for marking and coding using the paint specified in TT-E-489, yellow, color number 13538. Painted samples shall show no visible damage to intercoat or surface adhesion when prepared and tested as specified in 4.6.5.

3.8 Recovered materials. All products covered by this specification shall be new and shall not be fabricated using materials produced from recovered materials. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials.

3.9 Marking. The United States has adopted and is exercising legitimate control over the certification marks "JAN" and "J," respectively, to indicate that items so marked or identified are manufactured to, and meet all requirements of military specifications. Accordingly, items acquired to, and meeting all of the criteria specified herein and in applicable specifications shall bear the certification mark "JAN," except that items too small to bear the certification mark "JAN" shall bear the letter "J." The "JAN" or "J" shall be placed immediately before the part number, except that if such location would place a hardship on the manufacturer in connection with such marking, the "JAN" or "J" may be located on the first line above or below the part number. Items furnished under contracts or purchase orders which either permit or require deviation from the conditions or requirements specified herein or in applicable specifications, shall not bear "JAN" or "J." In the event an item fails to meet the requirements of this specification and the applicable specification sheets or associated detail specifications, the manufacturer shall remove the "JAN" or the "J" from the sample tested and also from all items represented by the sample. The "JAN" or "J" certification mark shall not be used on products acquired to contractor drawings or specifications. The United States Government has obtained Certificate of Registration Number 504,860 for the certification mark "JAN."

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 the 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 manufacturing operations, is an acceptable practice

MIL-B-24781(SH)

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 inspection. The inspection requirements specified herein are classified as follows:

- (a) First Article inspection (see 4.3).
- (b) Quality conformance inspection (see 4.4).

4.3 First article inspection. First article inspection shall be performed on the synthetic batterboard material when a first article sample is required (see 3.1, 6.2, and 6.4). One randomly selected synthetic batterboard panel shall be used for the examinations of 4.5 and the tests of 4.6, as specified in table I (see 3.3.5).

4.3.1 Lot definition. For the purpose of quality conformance inspection and test sampling, unless otherwise specified (see 6.2), a lot shall consist of material from one production run offered for delivery. A new lot shall be declared any time a batch of raw materials changes during the production run or when production conditions or designs change.

4.4 Quality conformance inspection. From each lot, one randomly selected synthetic batterboard panel shall be used for the examinations in 4.5 and the tests of 4.6.2, 4.6.3 and 4.6.8, as specified in table I (see 3.3.5).

4.5 Visual examinations. All synthetic batterboard samples shall be examined for the requirements of 3.3.1.1 and 3.3.1.2.

4.6 Testing. All synthetic batterboard panel specimens tested in 4.6.1 through 4.6.12 shall meet the requirements specified in table I (see 3.3.5). Unless otherwise stated, the test specimen shall be a sample representing the whole batterboard panel.

4.6.1 Water absorption. The test specimen shall be prepared and conditioned as in section 5.0 of ASTM D 570, cooled, and weighed to the nearest 0.001 gram. The conditioned specimen shall then be tested as in section 6.1 of ASTM D 570.

4.6.2 Flame spread. All exposed synthetic batterboard surface material(s) shall be prepared and tested in accordance with ASTM E 162, as modified in 4.6.2.1. Test specimens shall have a flame spread index as specified in table I, shall exhibit no dripping or puddling during the test, and shall exhibit no dripping or puddling, nor burning or smoldering, after the flame source has been removed.

4.6.2.1 Calibration of radiant panel. The procedure for calibrating the radiant panel shall be modified as follows to ensure that the radiation pyrometer is centered in the case housing and reading the correct temperature (see 8.3 of ASTM E 162). Marks shall be placed on the top, bottom and right- and lefthand sides of the 13.0- by 19.0-inch radiant panel case housing. On the top and bottom, the marks shall be placed 1.5 inches inward from the right- and left-hand corners, toward the center of the case housing. On the sides, the marks shall be placed 4.5 inches inward from the corners, toward the center of the case housing. The pyrometer shall be aimed to view the 10.0-inch radiant panel circular area. A piece of insulating board wider than

MIL-B-24781(SH)

19.0 inches shall be moved over the face of the radiant panel inward from the radiant panel edges toward the marks on the panel case housing. Just as a mark is passed, the pyrometer reading should drop. This procedure shall be done for the top, bottom and both sides. If it is necessary to move the pyrometer during this calibration process, the procedure shall be repeated from all four sides.

4.6.3 Smoke generation. All exposed synthetic batterboard surface material(s) shall be evaluated to determine the relative amount of smoke produced by burning or decomposition in accordance with ASTM E 662. The test data shall be reported as maximum flaming and non-flaming modes. Toxic products generated during the performance of ASTM E 662, shall not exceed the following limits when measured using ASTM E 800 (see table II). In addition to meeting the limits specified in table II, toxic products generated during the performance of ASTM E 662 shall not exceed the immediately dangerous to life or health (IDLH) limits of NIOSH pocket guide to chemical hazards. A Certificate of Technical Data Conformity shall be required for the IDLH requirement (see appendix B, section 30).

TABLE II. Smoke Toxicity

Chemical Constituent	Limit (ppm) \pm / Smoldering	Limit (ppm) \pm / Flaming
CO	50	150
HCN	0	0
HCL	20	20
HF	0	0
NOx	5	5
SO ₂	10	10
CO ₂	15,000	15,000
NH ₃	200	200
COCL ₂	0	0
H ₂ S	15	15
\pm / ppm = parts per million		

4.6.4 Resistance to chemical reagents. Test specimens shall be prepared and tested as in procedure I of ASTM D 543, for a total test duration of 24 hours at +73.4 degrees F (+23.0°C) and 50 percent relative humidity. The chemical reagents shall be as specified in 4.6.4.1 through 4.6.4.4.

4.6.4.1 Fire fighting fluid. The chemical reagent to be used in this test shall be AFFF Foam which shall be prepared using six parts of foam concentrate in accordance with MIL-F-24385 and 94 parts seawater.

MIL-B-24781(SH)

4.6.4.2 Hydraulic fluid. The chemical reagent to be used in this test shall conform to MIL-H-19457.

4.6.4.3 Aviation fuel. The chemical reagent to be used in this test shall conform to MIL-T-5624, grade JP-5 turbine fuel.

4.6.4.4 Lubricating fluid. The chemical reagent to be used in this test shall conform to MIL-L-7808.

4.6.5 Paintability. The test specimen representing the synthetic batterboard surface material facing into the well deck shall be prepainted and tested in accordance with FED-STD-141, Method 6301.

4.6.6 Compression set. The synthetic batterboard panel compression set shall be determined as specified in ASTM D 395, Method A, option 1. The required compression force shall be 610.0 pounds, and shall be applied at a temperature of +73.4°F (+23.0°C) for a time period of 1.0 hour. This test shall only be performed on elastomeric energy-absorbing materials used in the construction of the synthetic batterboard panel.

4.6.7 Impact. Impact testing shall be conducted to simulate the impact loading of the synthetic batterboard panels by a landing craft traveling at three knots. The impact tests shall be done at a test facility capable of conducting the SAE J972 test. Testing shall occur within the ambient temperature range specified in 3.3.6. The test site shall be configured as shown on figure 2 in appendix A. The impact tests shall be conducted with the synthetic batterboard panels attached to a bulkhead mounting fixture (see 6.5). Batterboard panel sizes shall be configured to cover the bulkhead mounting fixture impact area. Two impact tests shall be conducted with the impact vehicle traveling at a speed of 30.0 miles per hour (MPH) within a tolerance of plus or minus 1.0 mile per hour. The tests shall be in accordance with SAE J972 and the following sections:

4.6.7.1 Impact vehicle requirements. The 4000-pound impact vehicle shall meet the requirements specified for the "Common Carriage for Moving Barriers" described in figure 1 of SAE J972, except as modified by the Laboratory Test Procedure for FMVSS No. 301, section 11.B and 4.6.7.1.1 and 4.6.7.1.2.

4.6.7.1.1 The steel impact surface plate specified in FMVSS No. 301, section 11.B (2) shall be 1.0-inch thick and welded to the face plate reinforcement structure. The plywood facing shall not be used.

4.6.7.1.2 The total weight distribution of the impact vehicle, including the impact surface plate and carriage, specified in FMVSS No. 301, 11.B (1) (B), shall instead be 600.0 pounds at each rear wheel and 1400.0 pounds at each front wheel.

4.6.7.1.3 Accelerometers measuring accelerations in the forward, lateral, and vertical directions shall be mounted at the center-of-gravity of the impact vehicle and above the center of impact vehicle rear axle.

MIL-B-24781(SH)

4.6.7.1.4 The impact vehicle velocity of 30.0 mph shall be verified using an electronic measuring system located near the point of impact with the batterboard. Verification of the vehicle impact velocity shall be as specified in the Laboratory Test Procedure for FMVSS No. 301, section 10.5. The verification photograph of the vehicle velocity shall be submitted with the test report (see appendix C).

4.6.7.2 Impact surface fixture requirements. The impact surface fixture shall be configured as shown on figure 3 in appendix A. The fixture shall be rigidly attached at the right front corner of the steel impact surface plate (see 4.6.7.1.1) such that it does not elastically deflect with respect to the plate during the impact test. The horizontal centerline of the fixture shall be located 55.0 inches above the ground and attached to the plate such that the bend of the impact surface fixture contacts the batterboard surface (see figure 2, appendix A).

4.6.7.2.1 An accelerometer measuring accelerations in the forward and lateral directions shall be mounted on the impact vehicle at the corner where the impact surface fixture is mounted.

4.6.7.3 Batterboard test system requirements. The batterboard test system consists of the batterboard panels, the bulkhead mounting fixture and the impact vehicle with the impact surface fixture attached to the steel impact surface plate (see figure 2, appendix A).

4.6.7.3.1 The batterboard panels shall be installed on the bulkhead mounting fixture according to the requirements of 3.5 and 3.5.1 and be fastened to the hinged support channels using the hardware specified in 3.5.3.

4.6.7.3.2 Displacement measuring devices shall record the deflection of the respective batterboard panel on its backside due to the vehicle impact. These devices shall be mounted at the impact target location (see 4.6.7.3.3) and span an additional 12.0 inches from the target center toward the bulkhead mounting fixture centerline.

4.6.7.3.3 The bulkhead mounting fixture (see 6.5) with the attached batterboard panels shall be oriented at a 15-degree angle with respect to the line-of-travel of the impact vehicle and positioned on the ground such that the impact surface fixture hits within an 18-inch diameter target. The center of the target shall be located at 26.0 inches inward from the front right hand edge of the bulkhead mounting fixture and 55.0 inches upward from the ground. Photographic evidence shall be provided in the test report (see appendix C) to document that this requirement was met. If an impact is made outside of the target area, the test shall be considered void and must be rerun.

4.6.7.3.4 Measurement shall be made of any displacement of the bulkhead mounting fixture during the test. The maximum allowable displacement of the bulkhead mounting fixture shall not exceed 1.75 inches as measured at the geometric center of the fixture.

4.6.7.3.5 Impact loads shall be measured at the four corners of the bulkhead mounting fixture.

4.6.7.4 Photographic coverage. The following shall be the required photographic coverage of the synthetic batterboard system impact tests and shall be included in the test report (see appendix C).

MIL-B-24781(SH)

4.6.7.4.1 Still photographs. Color still photographs and their negatives shall be provided as follows:

- (a) Front, rear and side views of bulkhead mounting fixture before installation of the batterboard panels showing attachment of instrumentation.
- (b) Front and side views of the bulkhead mounting fixture after the installation of the batterboard panels.
- (c) Overview of test activity showing installation of bulkhead mounting fixture with batterboard panels attached.
- (d) Views taken looking down the back side of the batterboard panels showing the inward deflection after the test vehicle impacts the batterboard panels. The photos shall be taken from the time of impact for the next 30.0 milliseconds on 3.0-millisecond intervals.
- (e) Views taken looking down the front side of the batterboard panels showing the inward deflection after the test vehicle impacts the batterboard panels. The photos shall be taken from the time of impact for the next 30.0 milliseconds on 3.0-millisecond intervals.

4.6.8 Coefficient of friction. The dynamic coefficient of friction of the synthetic batterboard surface material facing into the well deck, shall be determined in accordance with the test procedure described in ASTM D 1894.

4.6.9 Abrasion resistance. The resistance to physical abrasion of the synthetic batterboard panel surface material facing into the well deck shall be determined as in Method B of ASTM D 1242. The specimen shall be tested using coarse grit (OE grade) flint paper, with a 30-pound carriage load for 100 cycles, and the results shall be reported as volume loss in cubic centimeters.

4.6.10 Impact requirements at temperature extremes. Test specimens shall be a sample representing each layer of a sandwich-type batterboard panel, or a sample representing the single layer of a homogeneous-type panel. Test specimens shall be prepared and tested as described in ASTM D 256, Method A. Specimens shall be tested at three temperature conditions; -20 degrees F (-28.9°C), +75 degrees F (+23.9°C) and +150 degrees F (+65.6°C). A temperature variation of plus or minus 3 degrees F (1.7°C) shall be allowed for test purposes.

4.6.11 Fungus resistance. The test specimen shall be prepared and tested in accordance with the MIL-STD-810, Method 508.

4.6.12 Electrical insulation resistance. The test specimen shall be prepared and tested in accordance with MIL-STD-202, Method 302, Test Condition B.

4.7 Toxicological product formulations. The contractor shall have the toxicological product formulations and associated information available for review by the contracting activity to evaluate the safety of the material for the proposed use.

4.8 Inspection of packaging. The sample packs and 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 herein.

MIL-B-24781(SH)

5. PACKAGING

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

5.1 General.

5.1.1 Navy fire-retardant requirements.

- (a) Lumber and plywood. When 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 - nonweather 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 as specified (see 6.2) in the contract or purchase order in accordance with ASTM D 4727.

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

5.2.1 Level A. Preservation shall be in accordance with MIL-P-116, meeting the requirements for method III (physical and mechanical protection).

5.2.2 Commercial. Commercial packaging (cleaning, preservation, cushioning, unit pack) 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 level A, B and C. Containers selected (see 5.3.2), shall be of minimum weight and cube consistent with the protection required and of uniform size.

5.3.2 Levels A, B and C containers. Batterboards 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 5.2), container selection shall be at the contractor's option.

5.3.2.1 Caseliners, closure and gross weight.

5.3.2.1.1 Caseliners. When specified (see 6.2), level A shipping containers containing batterboards preserved level A or commercial shall be provided with waterproof caseliners in accordance with MIL-STD-2073-1.

MIL-B-24781(SH)

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

5.3.2.1.3 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.

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

5.3.3.1 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 by mechanical handling equipment during shipment, stowage and storage.

5.4 Marking, levels A, B, C and commercial. In addition to any special marking required (see 6.2), interior packs and shipping containers shall be marked for shipment, stowage, and storage in accordance with MIL-STD-2073-1.

5.5 Material safety data sheet. A copy of the material safety data sheet shall be attached to the shipping document for each destination (see 3.2).

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 batterboard, a protective panel, is required in the well decks of U.S. Navy ships that carry boats, landing craft, and other equipment. Adverse sea conditions and the ability to control boats and landing craft within the well area, when open to the sea, require the use of batterboards to provide some form of protection to both the ship and the service craft.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.1 and 2.2).
- (c) When first article is required (see 3.2).
- (d) Synthetic batterboard panel dimensions (length, width and thickness) (see 3.3.1.2).
- (e) Synthetic batterboard system (batterboard panels and all installation hardware) dry weight and dry weight of existing wooden batterboard system (see 3.3.1.3).
- (f) Specific mounting fixture and hardware based on the ship class of the contract award (see 3.5).
- (g) Lot size, if other than as specified (see 4.3.1).
- (h) Navy fire-retardant requirements (see 5.1.1).

MIL-B-24781(SH)

- (i) Level preservation and of packing required (see 5.2 and 5.3).
- (j) Container selection if other than contractor's option (see 5.3.2).
- (k) When caseliner(s) are required (see 5.3.2.1.1).
- (l) Special markings, if required (see 3.9 and 5.4).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable data Item Descriptions (DIDs) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DIDs are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference paragraph</u>	<u>DID number</u>	<u>DID title</u>	<u>Suggested tailoring</u>
4.6.7.1.4, 4.6.7.3.3, appendix C	DI-MISC-80653	Test reports	----
4.6.7.4, appendix C	DI-MISC-80169	Still photo coverage	----

The above DID was cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DIDs are cited on the DD Form 1423.

6.4 First Article. When first article is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory, and the number of items to be tested as specified in 4.3. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval for first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirements for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the contract.

6.5 Government furnished equipment. The contracting officer should arrange to furnish the bulkhead mounting fixture listed in 4.6.7 and 4.6.7.3.3. The contracting officer may instead provide a drawing containing the fabrication details for the bulkhead mounting fixture.

6.6 Sub-contracted material and parts. The delivery requirements of referenced documents, listed in section 2, do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when equipment is shipped.

MIL-B-24781(SH)

6.7 Material Safety Data Sheet (MSDS). Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheet prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.8 Subject term (key word) listing.

Amphibious
Bulkhead mounting fixture
Composite
Well deck

Preparing Activity:
Navy - SH
(Project 2040-0213)

MIL-B-24781(SH)

APPENDIX A

10. SCOPE

10.1 Scope. This appendix contains the following three figures, to be used in preparation for the SAE J972 batterboard impact requirements test (see 4.6.7):

FIGURE 1. Maximum batterboard deflection.

FIGURE 2. Impact test site configuration.

FIGURE 3. Impact surface fixture.

This Appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS.

This section is not applicable to this appendix.

MIL-B-24781 (SH)

APPENDIX A

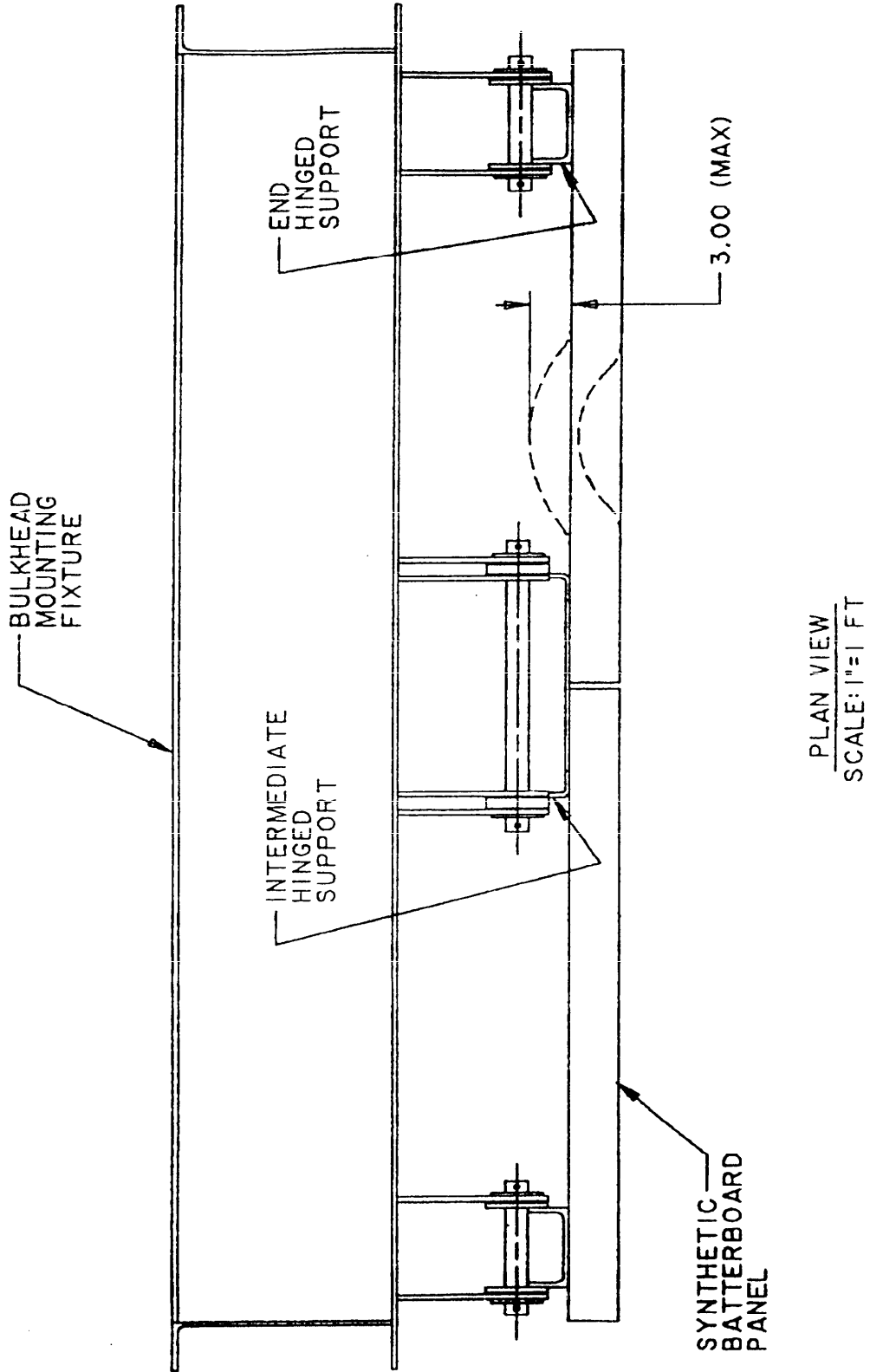


FIGURE 1. Maximum batterboard deflection

MIL-B-24781(SH)

APPENDIX A

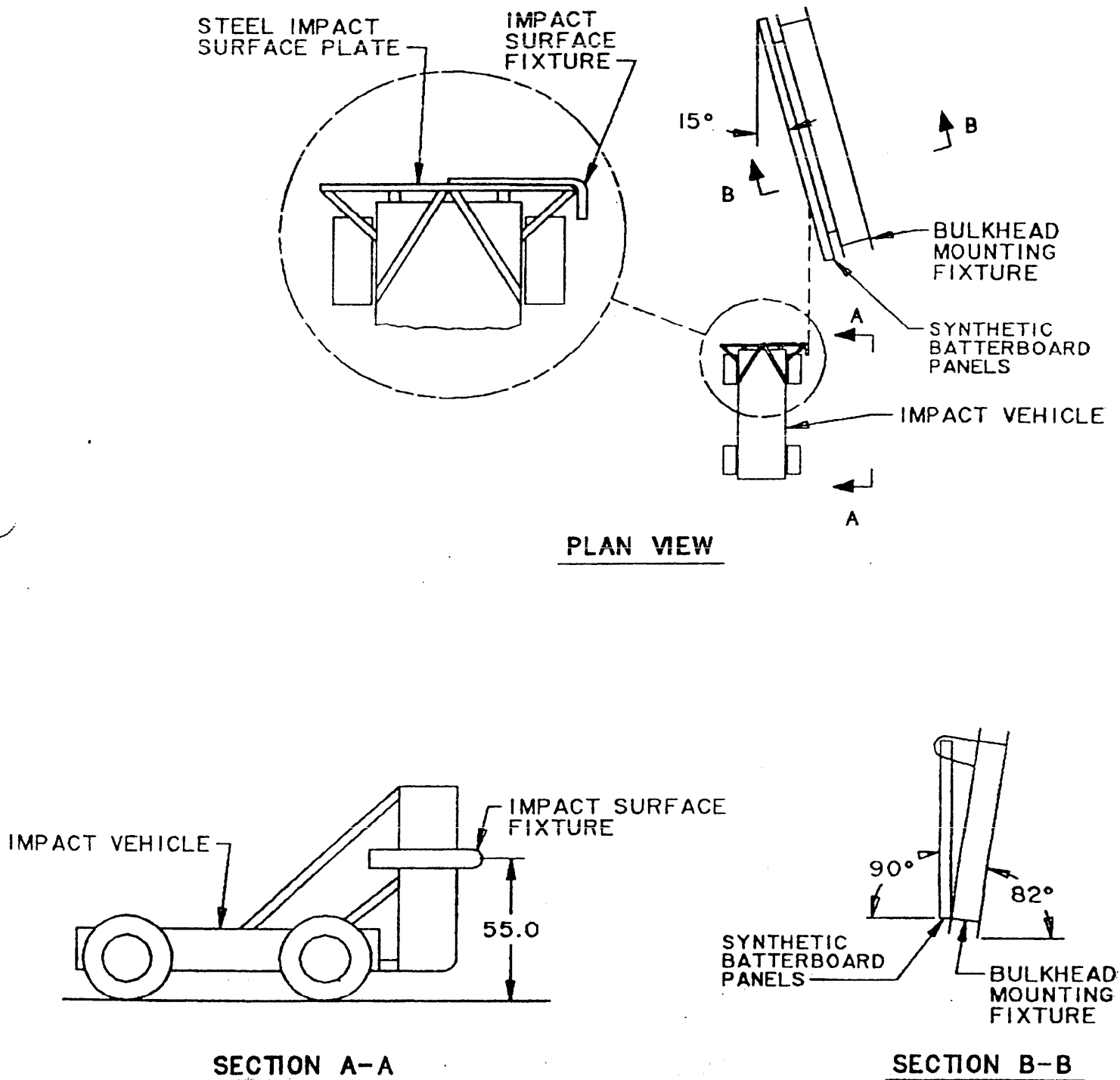
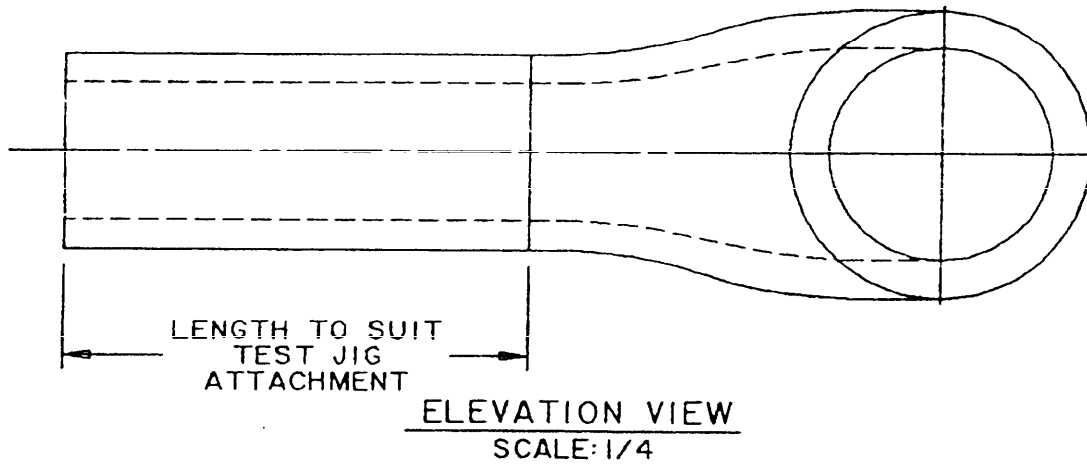
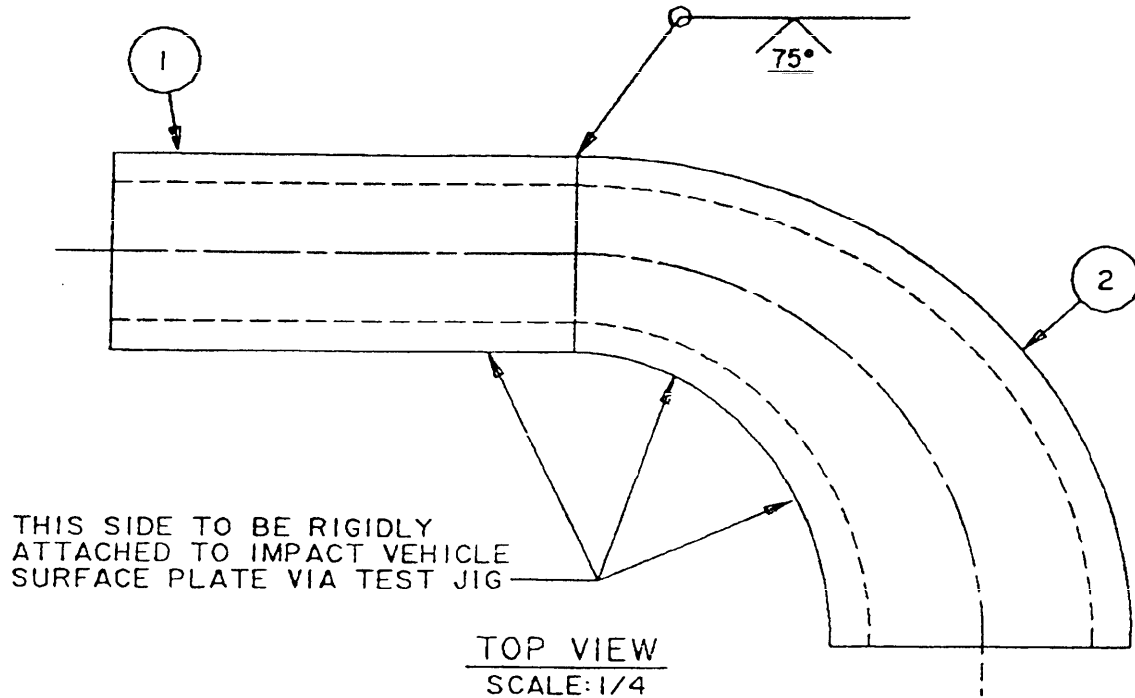


FIGURE 2. Impact test site configuration

MIL-B-24781(SH)

APPENDIX A



2	6.0 X 4.0 90°REDUCTION ELBOW (EXTRA STRONG, LONG RADIUS, SEAMLESS)	STL	ASTM-A106 GRADE B
1	4.0 DIA DOUBLE EXTRA STRONG PIPE (LENGTH TO SUIT TEST JIG ATTACHMENT)	STL	ASTM-A501
PC NO.	DESCRIPTION	MATERIAL	MATL SPEC
PARTS LIST			

FIGURE 3. Impact surface fixture

MIL-B-24781(SH)

APPENDIX B

CERTIFICATION OF TECHNICAL DATA CONFORMITY REQUIREMENTS

10. SCOPE

10.1 Scope. This appendix lists synthetic batterboard panel physical properties requiring a Certificate of Technical Data Conformity that the requirements of table 1, 3.3.1.3, 3.3.6, 3.6 and 4.6.3 (IDLH) are met. All technical data delivered under this specification shall be submitted in accordance with Department of Defense (DOD) Federal Acquisition Regulation (FAR) 252.227-7036. This Appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS.

20.1 Government documents.

20.1.1 Specifications, standards, and handbooks. This section is not applicable to this appendix.

20.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation (see 6.2).

DOCUMENT

U.S. Department of Defense (DOD)

Defense Federal Acquisition Regulation (DFAR) 252.227-7036 -
Certification of Technical Data Conformity.

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

30. CERTIFICATION

30.1 Certification content. A Certificate of Technical Data Conformity shall be included for the following:

30.1.1 Conformance that the following physical properties of synthetic batterboard material(s) (see 3.3.5) shall meet the requirements of table 1 when tested in accordance with the listed test procedures of table 1.

- (a) Water absorption (see 4.6.1).
- (b) Paintability (see 4.6.5).
- (c) Impact requirements at temperature extremes (see 4.6.10).
- (d) Fungus resistance (see 4.6.11).
- (e) Electrical insulation resistance (see 4.6.12).

MIL-B-24781(SH)

APPENDIX B

- 30.1.2 Conformance to synthetic batterboard system dry weight requirements (see 3.3.1.3).
- 30.1.3 Conformance to synthetic batterboard panel service temperature requirements (see 3.3.6).
- 30.1.4 Conformance to synthetic batterboard panel cleaning materials and cleaning methodology requirements (see 3.6).
- 30.1.5 Conformance to the IDLH limits of the NIOSH Pocket Guide to Chemical Hazards for synthetic batterboard smoke generation (see 4.6.3).

MIL-B-24781(SH)

APPENDIX C

TEST REPORT TECHNICAL CONTENT REQUIREMENTS

10. SCOPE

10.1 Scope. This appendix covers the technical content requirements and still photographic coverage that shall be included in test reports when required by the contract or order. This appendix is mandatory only when data item descriptions DI-MISC-80653 and DI-MISC-80169 are cited on the DD Form 1423 (see 6.3).

20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30. TECHNICAL CONTENT REQUIREMENTS

30.1 First article test report. The test report shall consist of the following sections:

- (a) Section 1 - Introduction:
 - (1) Test agency name and address.
 - (2) Test date.
 - (3) Test personnel and report authors.
 - (4) Synthetic batterboard vendor name, address, and product name.
- (b) Section 2 - Test results summary:
 - (1) Pass or fail results of impact test (see 3.3.1.1 and 3.4).
- (c) Section 3 - Test data:
 - (1) Impact vehicle forward, lateral, and vertical acceleration, velocity and displacement data (see 4.6.7.1.3 and 4.6.7.2.1). This data shall be graphed as acceleration versus time, and electronically integrated to produce velocity versus time and displacement versus time graphs. Filtering shall be sufficient to eliminate high frequency aborations in recorded data due to vibration.
 - (2) Displacement measurements of the batterboard panels (see 4.6.7.3.2).
 - (3) Maximum displacement of the bulkhead mounting fixture (see 4.6.7.3.4).
 - (4) Impact loads measured on the bulkhead mounting fixture (see 4.6.7.3.5). A force versus time graph documenting the amount of load transmitted through each of the load cells and a graph showing the summation of the four load cells versus time shall be provided.
- (d) Section 4 - Photographs

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.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

1 RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-B-24781(SB)	2. DOCUMENT DATE (YYMMDD) 93-01-04
3. DOCUMENT TITLE BATTERBOARD SYSTEM, SYNTHETIC			
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 Technical Point of Contact (TPOC) Mr. Robert Jones (SEA 56W21)		b. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON	
PLEASE ADDRESS ALL CORRESPONDENCE AS FOLLOWS:		(703) 602-1847	8-332-1847
c. ADDRESS (Include Zip Code) Commander, SEA 05Q42, Naval Sea Systems Command 2531 National Center 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	

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