

MIL-F-24646(SH)
30 November 1984

MILITARY SPECIFICATION

FUSE BOXES, GENERAL SPECIFICATION FOR

This specification is approved for use by the Naval Sea Systems Command, 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 general requirements for fuse boxes with or without switches used on Naval ships.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

- L-P-504 - Plastic Sheet and Film, Cellulose Acetate.
- L-P-535 - Plastic Sheet (Sheeting): Plastic Strip: Poly (Vinyl Chloride) and Poly (Vinyl Chloride - Vinyl Acetate), Rigid.
- QQ-B-654 - Brazing Alloys, Silver.
- QQ-N-281 - Nickel-Copper Alloy Bar, Rod, Plate, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections.
- TT-P-1757 - Primer Coating, Zinc Chromate, Low-Moisture-Sensitivity.
- LLL-R-626 - Rosin: Gum, Wood, and Tall Oil.

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, SEA 5523, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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- MIL-S-901 - Shock Tests, H.I. (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
- MIL-E-917 - Electric Power Equipment, Basic Requirements (Naval Shipboard Use).
- MIL-E-2036 - Enclosures for Electric and Electronic Equipment, Naval Shipboard.
- MIL-P-15024 - Plates, Tags and Bands for Identification of Equipment.
- MIL-P-15024/5 - Plates, Identification.
- MIL-P-15037 - Plastic Sheet, Laminated, Thermosetting, Glass-Cloth, Melamine-Resin.
- MIL-F-15160 - Fuses: Instrument, Power, and Telephone.
- MIL-S-15291 - Switches, Rotary, Snap Action and Detent/Spring Return Action.
- MIL-I-17214 - Indicator, Permeability; Low-Mu (GO-NO-GO).
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories and Repair Parts, Packaging and Packing of.

(See Supplement 1 for list of applicable specification sheets.)

STANDARDS

FEDERAL

- FED-STD-28 - Screw - Thread Standards for Federal Services.
- FED-STD-28/2 - Screw - Thread Standards for Federal Services, Section 2, Unified Thread Form and Thread Series for Bolts, Screws, Nuts, Tapped Holes and General Applications.

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-108 - Definitions of and Basic Requirements for Enclosures for Electric and Electronic Equipment.
- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
- MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
- MIL-STD-454 - Standard General Requirements for Electronic Equipment.

2.1.2 Government drawings. The following Government drawings form a part of this specification to the extent specified herein.

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DRAWINGS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

NAVSHIPS 9000-S6202-73055 - Fabricated Terminals (Closed End) and
Branch Buses for Electrical Fittings.

NAVSHIPS 9000-S6202-73246 - Fabricated Terminals (Closed End) and
Main Buses for Electrical Fittings.

(Copies of specifications, standards and drawings required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B46.1 - Surface Texture. (DoD adopted)

(Application for copies should be addressed to American National Standards Institute Inc., 1430 Broadway, New York, NY 10018.)

ASTM

B 36 - Brass Plate, Sheet, Strip and Roller Bar. (DoD adopted)

B 633 - Electrodeposited Coatings of Zinc on Iron and Steel.
(DoD adopted)

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

UNIFORM CLASSIFICATION COMMITTEE AGENT

Uniform Freight Classification Ratings, Rules and Regulations

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

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

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3.2 First article. When specified, a sample shall be subjected to first article inspection (see 4.4 and 6.3).

3.3 Materials. Materials shall be as specified (see 3.1). When not specified, the contractor may select any material that will perform the intended function in the equipment and will otherwise comply with the requirements of this specification.

3.3.1 Metals. Metals shall be of a corrosion-resistant type or shall be treated to resist corrosion as specified in MIL-E-917. Dissimilar metals, in contact with each other, shall be selected as specified in MIL-E-917. The selection of metals in contact shall also be such as to prevent galling.

3.3.1.1 Nonmagnetic materials. When specified (see 3.1), all parts for nonmagnetic fuse boxes shall be of a nonferrous material or a material generally considered nonmagnetic. The magnetic permeability shall be not greater than 2.0 after fabrication (see 4.7.10).

3.3.2 Brazing alloys. Brazing alloys for electrical connections shall be silver alloy type as specified in class BAg of QQ-B-654.

3.3.3 Nonmetallic materials. Nonmetallic materials shall be nonflammable, nontoxic, and fungus-inert as specified in MIL-E-917.

3.3.4 Prohibited materials. Prohibited materials shall be as specified in MIL-E-917 with the following additions:

- (a) Asbestos
- (b) Cadmium
- (c) Mercury (see 3.3.4.1)

3.3.4.1 Mercury. In addition to the mercury requirement as specified in MIL-E-917, no parts shall have come in direct contact with metallic mercury, mercury compounds or mercury bearing instruments or devices, employing only a single boundary of containment, during manufacture or inspection. (A single boundary of containment is one which is not backed up by a second seal or barrier to prevent escape and consequent mercury contamination in the event of rupture of the primary seal or barrier.)

3.3.5 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and shall be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. 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. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

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3.4 Parts.

3.4.1 Fuse clips. Fuse clips shall be as specified (see 3.1). Fuse clip retainers shall not be used with fuse clips for fuses rated 0-60 amperes (A). The clip shall be secured to the branch bus to allow easy removal without requiring disassembly of other parts and will withstand a pull-force as specified in 4.7.1.

3.4.2 Fuse base. The fuse base shall be of glass melamine, as specified in type GME of MIL-P-15037 or shall be a material selected from the laminates as specified in MIL-E-917, provided they meet the electrical and mechanical requirements (see 3.1). The laminate shall be furnished in natural color. Current carrying parts (less switches) shall be mounted on the fuse base. Unless otherwise specified (see 3.1), the fuse base shall be mounted in the approximate center of the enclosure.

3.4.3 Bus bars and connections. Bus bars and connections shall be brass, alloy 230 or 260 as specified in ASTM B 36.

3.4.3.1 Main bus bars. Main bus bars shall be of the sizes as specified (see 3.1). Holes in the bus bars may be punched or drilled and the contact area shall be smooth. Where punching is used, the operation shall not appreciably indent the surface of the bus bar in the vicinity of the hole.

3.4.3.2 Branch bus bars. Unless otherwise specified, branch bus bars shall be of the sizes as specified in Drawing 9000-S6202-73055 and shall be selected for the application specified (see 3.1).

3.4.3.3 Main and branch terminals. Unless otherwise specified (see 3.1), main and branch terminals shall be as specified in Drawings 9000-S6202-73055 and 9000-S6202-73246 and shall be selected for the applicable wire size specified (see 3.1). Terminals shall be silver brazed to the bus bars.

3.4.3.4 Studs and stud type main cable terminals. Unless otherwise specified (see 3.1), studs and stud type main cable terminals shall be as specified in Drawing 9000-S6202-73055 and shall be through bolted at the main bus bar. The nuts shall be torqued to $6.5 + .5$ foot-pounds (ft-lb) and tack welded by gas tungsten arc welding as specified in commercial procedures using CU-SN-C wire with 0.035 inch diameter. Only two tack welds shall be applied, one opposite the other at the junction of the nut flats and the main bus. One tack weld shall be applied to all nuts before the second tack weld is applied. Self locking nuts may be used in lieu of nuts requiring tack welding at the option of the contractor. The stud or main cable terminal may be ground smooth at the nut to meet electrical clearance requirements. Stud connections to the branch buses shall be as specified in Drawing 9000-S6202-73055. Stud connections shall be silver brazed to the branch and feeder bus bars.

3.4.3.5 Switch terminal connector. The terminal connector between the branch bus and switch shall be sized and formed as shown (see 3.1).

3.4.4 Switches. Where required (see 3.1), switches shall be as specified in MIL-S-15291. Switch type shall be as specified (see 3.1).

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3.4.4.1 Handles. Switch handles shall be brass, as specified in alloy 240 of ASTM B 36 and shall be as shown on figure 1. Handles shall be secured to the shaft extension by the use of corrosion resistant steel (CRES) setscrews, commercial grade, zinc coated.

3.4.4.2 Shaft extensions and coupling plates. Switch shaft extensions and coupling plates shall be CRES commercial grade, zinc coated, or nickel copper alloy as specified in QQ-N-281. The shaft extension shall, regardless of manufacturer, mate with and be compatible with the switch handle shown on figure 1. The coupling plates may be as shown on figure 1 or may be contractor's choice, providing they meet the requirements specified herein. Pins shall be of austenitic CRES commercial grade, zinc coated, or nickel-copper alloy as specified in QQ-N-281.

3.4.5 Commercial (hardware) parts. Commercial utility hardware items such as screws, bolts, and nuts may be used, provided they possess properties equivalent to and are replaceable by MS or AN part numbers.

3.4.6 Mounting parts. Unless otherwise specified (see 3.1), mounting parts, such as brackets, straps, angles and pads, shall be of the same material as the enclosure.

3.5 Design and construction. Fuse boxes shall be of the design, construction, and physical dimensions as specified (see 3.1). Fuses and wiring shall not be furnished.

3.5.1 Enclosures. Enclosures shall be of the material specified and shall be submersible (15-foot), watertight, or totally enclosed as specified (see 3.1).

3.5.1.1 Wiring diagram. The wiring diagram (see 3.1), shall be as specified in MIL-E-2036 except the plastic protective material shall be as specified in L-P-504 or L-P-535, as applicable.

3.5.1.2 Cable entrance. Unless otherwise specified (see 6.2.1), holes for stuffing tubes or cable connectors shall not be provided.

3.5.1.3 Stuffing tubes. Unless otherwise specified (see 6.2.1), stuffing tubes shall not be furnished.

3.5.1.4 Mounting. The location of mounting holes shall be as specified (see 3.1). The enclosure shall support the total assembly of the box, fuses, switches, where required, and associated hardware by the mounting means specified. Mounting bolts shall not be furnished.

3.5.2 Threaded parts and fastening devices. Threaded parts and fastening devices shall be as specified in MIL-E-917 with the exceptions specified in 3.5.2.1 and 3.5.2.2.

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3.5.2.1 Screw threads. Screw threads shall be as specified in FED-STD-28. Unless otherwise specified (see 3.1), screw threads shall be right-hand, coarse-thread series, unified form, class 2A or 2B as specified in FED-STD-28/2.

3.5.2.2 Thread locking at electrical connections. Thread locking at electrical connections shall be as follows:

- (a) Lockwashers need not be used to lock the nuts at the main bus nor the nuts at the fuse clips, providing none of the nuts become loosened during the vibration and shock tests (see 4.7.8 and 4.7.9).
- (b) Unless otherwise furnished with the switch, lockwashers need not be used with the screw at the switch terminal.

3.5.3 Welding and brazing. Welding and brazing of nonelectrical parts shall be in accordance with commercial practices and shall meet the requirements specified herein.

3.5.3.1 Brazing. Parts or components shall be fastened by intermittent localized brazing in such a manner as to ensure that each enclosure assembly will not be completely soft-annealed and will not distort or leak when subjected to the shock tests (see 4.7.9).

3.5.4 Stress relief. Metals used in the fuse box assemblies shall be treated or heat treated to prevent deterioration or failure due to stresses or other conditions resulting from working, forming and similar processes during fabrication.

3.5.5 Drilling, countersinking and tapping. Drilling, countersinking and tapping shall be done before painting or finish is applied.

3.5.6 Sealing counterbored holes. Counterbored holes in the bottom of the fuse base shall be filled with type I, grade D rosin or sealing wax as specified in LLL-R-626 after screws are in place.

3.5.7 Component spacing and arrangement. Unless otherwise specified (see 3.1), component spacing and arrangement within the boxes shall be as follows:

- (a) Current carrying parts shall be so arranged as to avoid overheating due to inductive effects.
- (b) Terminals shall be offset to facilitate wiring. In a box having three main terminals, the holes in the two outer terminals shall be angled in towards the center terminal between 15 degrees and 30 degrees. In a box having two main terminals, the holes in each shall be angled in towards the other between 15 degrees and 30 degrees. The holes in the branch terminals shall be offset approximately 30 degrees in the same direction as specified in Drawing 9000-S6202-73055.
- (c) Fuse clips shall be aligned so as not to apply stresses to fuses.

3.5.8 Electrical creepage and clearance distances. Unless an insulating barrier is used, electrical creepage and clearance distances shall be as specified in MIL-E-917.

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3.5.8.1 Insulating barriers. Insulating barriers shall be of the same material as the base and shall be a minimum of 1/8-inch thick when there is a possibility of impact or abrasion to the material resulting from shock or vibration, otherwise it can be 1/16-inch thick. Barriers for branch buses shall be force-fit and cemented in a slot cut into the base. The cement shall be commercial grade and shall be such as to prevent the barriers from becoming loosened during the shock and vibration tests (see 4.7.9 and 4.7.8). Barriers (sub bases) for main buses shall be secured by through bolting with the same studs holding the main buses.

3.5.9 Polarity and phase identification.

3.5.9.1 Polarity. For direct current (d.c.), like polarities shall be similarly disposed. Facing the box, the top bus shall be positive (+); the center bus, where furnished, shall be positive and negative (+) (to indicate the voltage is at some value in between + and -); and the bottom bus shall be negative (-). Should bus bars be vertical, the marking shall be as specified, when the fuse box is rotated 90 degrees counterclockwise. Polarity identification shall be clearly marked (see 3.8.3).

3.5.9.2 Phase sequence. For alternating current (a.c.) like phases shall be similarly disposed. Facing the front of the panel, the phase rotation shall be C, B, and A respectively, from left to right or bottom to top. Phase identification shall be clearly marked (see 3.8.3).

3.6 Performance characteristics.

3.6.1 Dielectric withstanding voltage. Fuse boxes shall exhibit no evidence of arcing (other than at test probes), corona (visible, audible or smell), flashover or punctured insulation when tested as specified in 4.7.2.

3.6.2 Insulation resistance. The insulation resistance of the electrical circuits shall be not less than 10 megohms when tested as specified in 4.7.3.

3.6.3 Operation. When operated at rated load (see 3.1), the circuits shall be energized as specified on the wiring diagram (see 4.7.4). Where switches are installed, they shall be operated through all positions to ensure there is no mechanical binding and that they make and break the circuits.

3.6.4 Temperature rise. Temperature rise in current carrying parts such as bus bar connections, terminals, fuse clips, and switches (where applicable) shall not exceed 45 degrees Celsius (°C) above an ambient room temperature of 25°C and the enclosure interior ambient temperature shall not exceed 65°C when subjected to the tests as specified in 4.7.5.

3.6.5 Salt spray. When fuse boxes are tested as specified in 4.7.6, there shall be no evidence of excessive corrosion. Excessive corrosion is defined as that which interferes with the electrical or mechanical performance, or, in the case of plated metals, corrosion which has migrated through the plating and attacked the base metal. Where corrosion-resistance treatments are used, limited superficial corrosion such as would result from scratches will be permissible.

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3.6.6 Level of effectiveness of enclosure. The fuse boxes shall meet the specific degree of enclosure requirements specified (see 3.1) when tested as specified in 4.7.7. Following the test, the fuse boxes shall pass the dielectric withstanding voltage test (see 4.7.2).

3.6.7 Vibration. When fuse boxes are tested as specified in 4.7.8, the branch circuits shall remain energized and there shall be no electrical or mechanical damage nor shall any screws or nuts become loosened. Where switches are present, there shall be no momentary opening or transfer of switch contacts during the test.

3.6.8 Shock. The branch circuits shall remain energized during and after the shock test as specified in 4.7.9 and no portion of the equipment shall come adrift or otherwise create a hazard to personnel or other components nor shall any screws or nuts become loosened. Where switches are present, there shall be no momentary opening or transfer of the switch contacts. Following the test, the fuse boxes shall pass the level effectiveness of enclosure and dielectric withstanding voltage tests (see 4.7.7 and 4.7.2).

3.7 Finish.

3.7.1 Surface finish. Surface finishes shall be as specified in ANSI B46.1.

3.7.2 Zinc coating. Zinc coating, where required (see 3.1), shall be as specified in ASTM B 633.

3.7.3 Painting. Unless otherwise specified (see 6.2.1), steel and aluminum enclosures shall be painted and brass enclosures shall be neither primed nor painted. Parts such as angles, brackets, straps, and pads installed in the steel and aluminum enclosures shall be pretreated as specified in MIL-E-917 and shall be given one coat of primer as specified in TT-P-1757. The entire enclosure, less base, switches (where applicable), and attaching hardware, shall then have topcoat applied as specified in MIL-E-917.

3.8 Marking.

3.8.1 Information and identification plates. Information and identification plates shall be attached to the box cover by means of screws in tapped holes or screws held by pads brazed to the back of the cover. Unless otherwise specified (see 3.1), plates for steel and brass boxes shall be brass; plates for aluminum shall be CRES types A, B, or C as specified in MIL-P-15024 and severe service of MIL-P-15024/5. Plate size shall be compatible with the amount of information required and shall be standard dimensions as specified in MIL-P-15024 and MIL-P-15024/5.

3.8.1.1 Manufacturer's identification plate. The manufacturer's identification plate shall contain, as a minimum, the following information:

- (a) Military part number (for example M24646/1-001).
- (b) Symbol number (see 3.1).
- (c) Prime manufacturer's name or trademark.
- (d) Contract number.
- (e) National stock number (NSN), if assigned.

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On totally enclosed boxes (see 3.1), the plate shall be approximately centered in the upper or lower part of the cover with the upper part preferred. On submersible and watertight boxes, the plate shall be on the outermost portion of the cover (outside the seal). The exact location and size shall be the contractor's choice and shall be positioned such as not to interfere with the placement of the information plate.

3.8.1.2 Information plates. Information plates shall be furnished for each set of fuses. Unless otherwise specified (see 6.2.1), information plates shall be furnished blank. Information plates for all totally enclosed watertight boxes shall be positioned directly over the circuit identified. Information plates for all other submersible boxes shall be positioned on the outermost portion of the cover (outside the seal) adjacent to the circuit identified. For fused boxes with switches, an information plate showing the off position for each switch shall be furnished. This plate may be the same material as the box and may be welded or brazed to the box, as applicable.

3.8.2 Caution and warning plates. When specified, caution and warning plates shall be as specified (see 3.1).

3.8.3 Polarity or phase marking. The base shall be clearly marked adjacent to each terminal and fused branch circuit with the polarity (+ and - signs) or phase sequence (C, B, A, or AC, AB and BC). Marking shall be permanent and legible and shall be white paint applied by stenciling or silk screening or rubber stamping with white smudge proof ink covered with a clear lacquer of commercial grade.

3.9 Workmanship. Workmanship shall be as specified in requirement 9 of MIL-STD-454.

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 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 assure supplies and services conform to prescribed requirements.

4.1.1 Inspection system. The contractor shall provide and maintain an inspection system in accordance with the data ordering documents included in the contract or order (see 6.2.2).

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

- (a) First article inspection (see 4.4).
- (b) Quality conformance inspection (see 4.5).

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4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with MIL-STD-202.

4.3.1 Preparation of inspection. Fuses, of the amperages specified, shall be as specified in MIL-F-15160 and shall be installed during operational and electrical tests as specified (see 3.1).

4.4 First article inspection. First article inspection shall be performed on sample units which have been produced with equipment and procedures normally used in production. A first article inspection report shall be prepared in accordance with the data ordering document included in the contract or order (see 6.2.2). Acceptance will be allowed for all fuse and fused distribution box sizes of the category submitted (see 4.4.1) up to and including the maximum size tested and accepted. Fuse box sizes will be determined by the number of circuits in the box.

4.4.1 Sample size. One fuse box of each symbol number (covered by a single specification sheet (see 3.1)) shall be subjected to first article inspection.

4.4.2 Inspection routine. The sample shall be subjected to the inspections as specified in table I.

TABLE I. First article inspection.

Inspection	Requirement paragraph	Test paragraph
Visual and dimensional examination	3.1, 3.3, 3.4, 3.5, 3.7, 3.8 and 3.9	4.6.1
Pull-test	3.4.1	4.7.1
Dielectric withstanding voltage	3.6.1	4.7.2
Insulation resistance	3.6.2	4.7.3
Operation	3.6.3	4.7.4
Temperature rise	3.6.4	4.7.5
Salt spray	3.6.5	4.7.6
Effectiveness of enclosure	3.6.6	4.7.7
Vibration	3.6.7	4.7.8
Shock	3.6.8	4.7.9
Magnetic permeability (where applicable)	3.3.1.1	4.7.10

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4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspection.

4.5.1.1 Inspection lot. An inspection lot shall consist of fuse boxes of the same category (covered by a single specification sheet (see 3.1)), produced under essentially the same conditions, and offered for inspection at one time.

4.5.2 Group A inspection. Group A inspection shall consist of the inspections as specified in table II.

TABLE II. Group A inspection.

Inspection	Requirement paragraph	Test paragraph
Visual and dimensional examination	3.1, 3.3, 3.4, 3.5, 3.7, 3.8 and 3.9	4.6.1
Operation	3.6.3	4.7.4

4.5.2.1 Sampling plan. Sample fuse boxes shall be selected from each lot as specified in MIL-STD-105 for general inspection level II. Acceptable quality levels (AQL) shall be 1.5 percent defective.

4.5.3 Group B inspection. Group B inspection shall consist of the inspections as specified in table III, in the order shown with samples selected from inspection lots that have passed group A inspection.

TABLE III. Group B inspection.

Inspection	Requirement paragraph	Test paragraph
Effectiveness of enclosure	3.6.6	4.7.7
Dielectric withstanding voltage	3.6.1	4.7.2
Insulation resistance	3.6.2	4.7.3
Magnetic permeability (where applicable)	3.3.1.1	4.7.10

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4.5.3.1 Sampling plan. The sampling plan shall be as specified in MIL-STD-105 for special inspection level S-4. The AQL shall be 4 percent defective.

4.6 Examinations.

4.6.1 Visual and dimensional examination. Fuse boxes shall be visually examined to verify that the materials, design, construction, physical dimensions, marking and workmanship are as specified in the applicable requirements (see 3.1, 3.3, 3.4, 3.5, 3.7, 3.8 and 3.9).

4.7 Tests.

4.7.1 Pull-test. A force of 20 pounds shall be applied to each fuse clip for a period of 5 to 10 seconds. The force applied shall consist of a direct axial pull. Any sign of loosening of the clip or distortion or breaking of materials surrounding the clip shall be cause for rejection.

4.7.2 Dielectric withstanding voltage. Fuse boxes shall be subjected to a dielectric withstanding voltage test as specified in method 301 of MIL-STD-202. The following details shall apply:

- (a) Test voltage: for circuits rated 600 volts (V) or less, twice rated circuit voltage plus 1000 V; for circuits rated above 600 V, 2-1/4 times rated voltage plus 2000 V.
- (b) Nature of potential: a.c. (root mean square (rms)).
- (c) Points of application: between electrical circuits and ground (enclosure). Where switches are present, they shall be in the energized (closed) position.
- (d) Rejection criteria: failure to conform to 3.6.1.

4.7.3 Insulation resistance. Insulation resistance shall be measured as specified in method 302 test condition B of MIL-STD-202. The test voltage shall be applied, between electrical circuits and ground (enclosure). When switches are present, they shall be in the energized (closed) position. A resistance of less than 10 megohms shall be cause for rejection.

4.7.4 Operation. Electrical circuits shall be energized at rated voltage and the voltage at the output circuits shall be measured. When switches are installed, they shall be operated through all positions. Failure of the circuits to function as specified in the wiring diagram or mechanical binding of the switches, where applicable, shall be cause for rejection.

4.7.5 Temperature rise. The fuse boxes shall be energized at rated voltage and current and the temperature of current carrying parts and the enclosure interior ambient temperature recorded when temperature readings have stabilized. Temperature sensitive elements, such as thermocouples of small wire (28-32 AWG), shall be placed on the current carrying parts and suspended approximately 1/2 inch below the cover. Temperature stabilization shall be considered to have occurred when three successive readings taken at 1/2-hour intervals are within plus or minus 1°C. Failure to conform to 3.6.4 shall be cause for rejection.

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4.7.6 Salt spray. Fuse boxes shall be tested as specified in method 101, test condition A of MIL-STD-202. Evidence of excessive corrosion shall be cause for rejection (see 3.6.5).

4.7.7 Effectiveness of enclosure. Fuse boxes shall be tested as specified in MIL-STD-108, except they shall not be energized. Rejection or acceptance criteria shall be as specified in MIL-STD-108 and 3.6.6.

4.7.8 Vibration. The fuse boxes shall be subjected to the type I vibration test as specified in MIL-STD-167-1. The following details and exceptions shall apply:

- (a) Frequency - the variable frequency tests shall be omitted.
- (b) Electrical test conditions - the circuits shall be energized at rated voltage. Test equipment shall be used to monitor the output voltage on fuse boxes. On fused distribution boxes with switches, oscillographs shall be taken during the last minute of the final tests along each principal axis.
- (c) Rejection criteria - failure to conform to 3.6.7.

4.7.9 Shock. The fuse boxes shall be subjected to the high-impact shock test for grade A, type A, class I equipment as specified in MIL-S-901. The following details shall apply:

- (a) Electrical test conditions - the circuits shall be energized at rated voltage. Test equipment shall be used to monitor output voltage on fuse boxes. On fused distribution boxes with switches, the coil of a relay calibrated for the rated voltage of the box being tested and having a drop-out time of 0.02 second, shall be connected in series with the energized contacts of the switch.
- (b) Rejection criteria - failure to conform to 3.6.8 except fuse failure shall not be cause for rejection.

4.7.10 Magnetic permeability. The relative permeability of the enclosures, less switches, shall be checked using a low- μ indicator as specified in MIL-I-17214 and shall have a permeability not greater than 2.0.

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

5. PACKAGING

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

5.1 Preservation, packaging and marking. Fuse boxes shall be individually preserved as specified for junction boxes level A or C, packed level A, B or C as specified (see 6.2.1) and marked in accordance with MIL-E-17555. Special marking shall be specified (see 6.2.1).

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6. NOTES

6.1 Intended use. The fuse boxes are used to distribute electrical power to branch circuits and provide fused protection of the feeder circuit. Boxes with switches provide selective control of power distribution to branch circuits.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification and specification sheet, as applicable.
- (b) Military part number.
- (c) If holes for stuffing tubes or cable connectors are required (see 3.5.1.2).
- (d) If stuffing tubes are required (see 3.5.1.3).
- (e) If painting is to be other than specified (see 3.7.3).
- (f) Marking for circuit information plates, if required (see 3.8.1.2).
- (g) Level of preservation packaging and packing required (see 5.1).
- (h) If special marking is required (see 5.1).

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of FAR 52.227-7031 are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.1.1	Inspection program plan	DI-R-4803	---
4.4	First article inspection report	DI-T-4902	---

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

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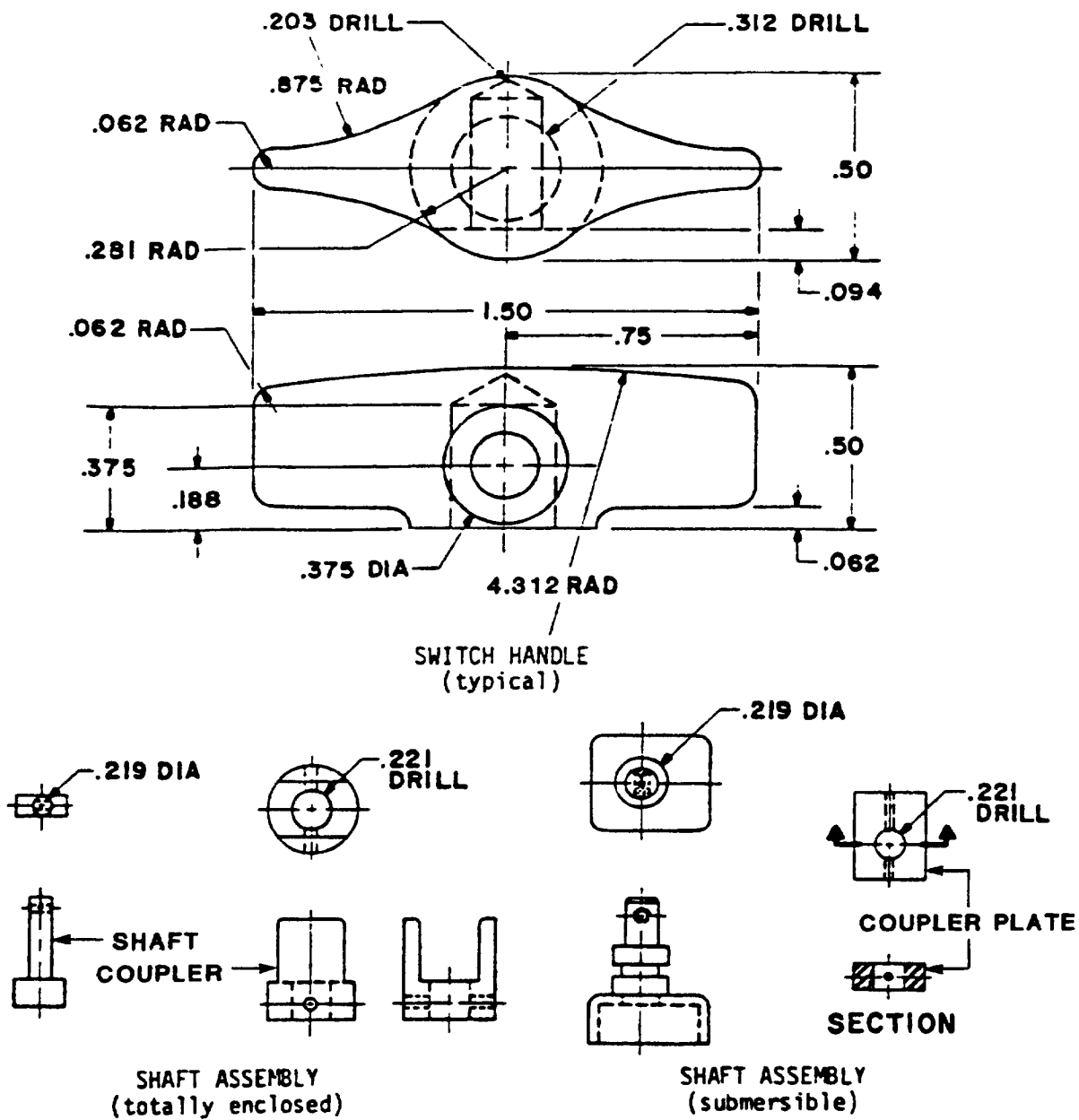
6.3 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such 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 pending contract.

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

6.5 Symbol number. The symbol number is a standard electrical equipment designation. Symbol numbers are listed in NAVSEA S0300-AT-GPP-010/ESL.

Preparing activity:
Navy - SH
(Project 6110-N264)

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FIGURE 1. Switch handle and shaft linkage.

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1. DOCUMENT NUMBER MIL-F-24646(SH)	2. DOCUMENT TITLE FUSE BOXES, GENERAL SPECIFICATION FOR
3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify) _____
b. ADDRESS (Street, City, State ZIP Code)	
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6. REMARKS 	
7a. NAME OF SUBMITTER (Last, First, MI) - Optional	b. WORK TELEPHONE NUMBER (Include Area Code) - Optional
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