

MIL-F-16377G(SH)
5 June 1981
SUPERSEDING
MIL-F-16377F(SHIPS)
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(See 6.12)

MILITARY SPECIFICATION

FIXTURES, LIGHTING; AND ASSOCIATED PARTS; SHIPBOARD USE, 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 fluorescent and incandescent lighting fixtures (lights) and associated parts, used for detail and general illumination on Naval ships and boats.

1.2 Classification. Lighting fixtures shall be of the following types and classes, as specified (see 3.1 and 6.2):

Type I - Fluorescent.
Type II - Incandescent.
Class 1 - Detail illumination.
Class 2 - General illumination.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

W-F-406 - Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible.
W-S-755 - Starter, Fluorescent Lamp.

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 3112, 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-M-14 - Molding Plastics and Molded Plastic Parts; Thermosetting.
- MIL-P-116 - Preservation, Methods of.
- MIL-V-173 - Varnish, Moisture- and Fungus-Resistant (For the Treatment of Communications, Electronic and Associated Equipment).
- MIL-S-901 - Shock Tests, H.I. (High-Impact); Snipboard Machinery, Equipment and Systems, Requirements For.
- MIL-C-915/40 - Cable, Electrical, 600 Volts, Types DPS, EPS, TPS, And 7PS.
- MIL-E-917 - Electric Power Equipment, Basic Requirements (Naval Shipboard Use).
- MIL-L-970 - Lampholders and Starter Sockets, General Specification for (Naval Shipboard Use).
- MIL-L-970/10 - Lampholder, Miniature BI-Pin For Fluorescent Lamps 250-Volts, 75-Watt.
- MIL-L-970/11 - Lampholder, Medium, BI-Pin For Fluorescent Lamps, 250-Volt, 660-Watt.
- MIL-L-970/13 - Lampholder, Socket, Fluorescent Lamp Starter, 250-Volt, 75-Watt.
- MIL-L-970/15 - Lampholder, Miniature BI-Pin, Heat Resistant, For Fluorescent Lamps, 250-Volts, 75-Watt.
- MIL-L-970/18 - Lampholder, Medium BI-Pin, Heat Resistant, For Fluorescent Lamps, 250-Volt, 660-Watt.
- MIL-L-970/19 - Lampholder, Socket, Fluorescent Lamp Starter, Heat Resistant, 250-Volt, 75-Watt.
- MIL-B-5423 - Boots, Dust and Water Seal (for Toggle and Pushbutton switches and Rotary-Actuated Parts), General Specification for.
- MIL-C-6021 - Casting, Classification and Inspection of.
- 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-Clotn, Melamine-Resin.
- MIL-I-17214 - Indicator, Permeability; Low-Mu (Go-No-Go).
- MIL-E-17555 - Electronic and Electrical Equipment and Associated Repair Parts, Packaging and Packing of.
- MIL-S-19622 - Stuffing Tubes, Nylon: General Specification.
- MIL-P-24191 - Plastic Sheet, Cast, Acrylic, Snipboard Application (Illumination and Signal Lighting).
- MIL-I-45208 - Inspection System Requirements.
- MIL-T-55164 - Terminal Boards, Molded, Barrier, Screw and Stud Types, and Associated Accessories, General Specification for.

STANDARDS

FEDERAL

- FED-STD-H28 - Screw-Inread Standards for Federal Services.
- FED-STD-595 - Colors.

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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.
- MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
- MIL-STD-454 - Standard General Requirements for Electronic Equipment.
- MIL-STD-462 - Electromagnetic Interference Characteristics, Measurements of.
- MIL-STD-740 - Airborne and Structureborne Noise Measurements and Acceptance Criteria of Shipboard Equipment.
- AN6227 - Packing, "O" Ring Hydraulic.
- MS16569 - Switch, Toggle, Double Pole, Single Throw (For Use in Lighting Fixtures Only).
- MS16656 - Switch, Toggle, Single Pole, Single Throw (For Use in Lighting Fixtures Only).

See Supplement-1 for list of applicable specifications sheets.

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

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.)

AMERICAN NATIONAL STANDARD INSTITUTE, INC. (ANSI)
B46.1 - Surface Texture.
Y14.36 - Surface Texture Symbols.

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

AMERICAN WELDING SOCIETY, INCORPORATED (AWS)
A2.0 - Welding Symbols.

(Application for copies should be addressed to the American Welding Society, Incorporated, 2501 Northwest 7th Street, Miami, FL 33125.)

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ILLUMINATION ENGINEERING SOCIETY (IES)
General Guide to Photometry.

(Application for copies should be addressed to the Illumination Engineering Society, 345 East 47th Street, New York, NY 10017.)

UNDERWRITERS' LABORATORIES, INC. (UL)
UL-486 - Wire Connectors and Soldering Lugs.

(Application for copies should be addressed to the Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
D2843 - Density of Smoke from the Burning or Decomposition of Plastics.
D635 - Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.

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

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

3. REQUIREMENTS

3.1 Specification sheets. Requirements for individual types, classes, and symbols shall be as specified herein and in the applicable specification sheet. In the event of any conflict between requirements of this specification and the specification sheets, the latter shall govern (see 6.2.1). Documents referenced in the specification sheets shall be of the issue in effect on date of invitation for bid or request for proposal.

3.2 First article inspection. Prior to beginning production, a sample fixture, light or part manufactured by production tools and processes shall be inspected as specified in 4.3 (see 3.3 and 6.4).

3.3 Certification of drawings acceptance. A prerequisite to submission of the first article for inspection shall be submittal of satisfactory evidence to the contracting activity that the Naval Sea Systems Command (NAVSEA) (see 6.7) has reviewed and accepted the manufacturing drawings for the fixture, light or part to be furnished under this specification. The contractor shall prepare drawing acceptance procedures, drawings, and certification data sheets in accordance with the data ordering documents included in the contract or order (see 6.2.2), and as specified in 3.3.1 through 3.3.1.2.

3.3.1 Drawing acceptance procedures. Two sets of prints of the manufacturing drawings for the fixture, light or part, followed by two sets of prints of the certification data sheet (see 6.2.2) shall be submitted to NAVSEA for review. Acceptance will be based upon the

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completeness of the drawing and other data, submitted by the contractor; conclusively providing proof of proper performance of the fixture, light or part in accordance with this specification and the applicable specification sheet. Drawing acceptance shall be obtained in writing.

3.3.1.1 Submission of revised drawings. When a drawing is not accepted, submission of a revised drawing is required. In addition, NAVSEA may require the submission or resubmission of other drawings and documents which may be required for reference.

3.3.1.2 Changes. The contractor shall make no changes in any accepted drawing. If changes are required, revised drawings shall be submitted in accordance with 3.3.1.

3.4 Materials.

3.4.1 General requirements. The materials used in the construction of the fixtures or parts shall be as specified herein and of a type, class, form and grade which is readily available from normal sources of supply without the necessity for additional treatment or processing other than that which is normal to, or readily supplied by, the industry. The contractor shall ascertain compliance of all materials with the minimum requirements and suitability of each material for its specific use and for the service intended. Material requirements fall into three general categories as specified hereinafter.

3.4.1.1 Specific materials. Where a specific material and material specification is specified herein or in the specification sheet, the material used shall conform to that specification. Materials purchased in accordance with manufacturer's specification or specifications other than those indicated are acceptable only if materials and quality assurance procedures do, in fact, conform to the minimum requirements of the referenced specification.

3.4.1.2 Materials requiring NAVSEA acceptance. The contractor may substitute material of equivalent grade in lieu of the specified materials, provided that all other requirements of the individual specifications are fulfilled. Before such substitutions are made, acceptance for each application shall be obtained in writing from NAVSEA. If the contractor desires to make substitution for a specified material after the design has been accepted a statement shall be submitted to NAVSEA describing the proposed substitution, together with evidence to substantiate the claim that such substitution is desirable and will not affect reliability. At the discretion of NAVSEA, test samples may be required to prove the suitability of the proposed substitution.

3.4.1.3 Material not specified. Where a specific material is not specified or NAVSEA acceptance is not required, the contractor may select any material that will satisfactorily perform the intended function in the fixture, light or part and will otherwise comply with specification requirements.

3.4.1.4 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

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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.

3.4.2 Prohibited materials. Flammable or explosive material, or material which can produce toxic or suffocating fumes, or material which can produce a smoke density rating above 50 (see table I), when burned shall not be used unless specifically approved by NAVSEA. Prohibited materials (toxic, flammable, fragile, radioactive, magnesium, and mercury, carcinogens and asbestos), when allowed for the specific use shall conform to the requirement of MIL-E-917, except as specified hereinafter.

3.4.2.1 Flammable plastic materials. As a guide, plastic materials, when not specified herein or on the applicable specification sheet, shall be selected in accordance with table I.

TABLE I. Flammability characteristics of plastics.

Characteristic	Specimen (Inches)	Applicable test method	Limit
Flammability rate	5L. X 1/2W. X 1/4T	ASTM D635	1.35 max. Inches per minute
Smoke density rating	1L.X1WX1/4T	ASTM D2843	0 to 50

3.4.3 Fungus-inert materials. Fungus-inert materials shall be in accordance with requirement 4 of MIL-STD-454.

3.4.4 Arc-resistant materials. Arc-resistant materials shall conform to requirement 26 of MIL-STD-454.

3.4.5 Metals. Metals shall be selected or processed and applied in a manner that provides corrosion-resistance. Metals that are not inherently corrosion-resistant (see 3.4.5.2) shall be processed (treated, plated or painted) to provide corrosion-resistance.

3.4.5.1 Selection of metals in direct contact. In order to minimize corrosion attack due to electrolytic action between dissimilar metals, in contact with each other, metal-to-metal contacts shall be limited to those metals which, when coupled, are in accordance with MIL-E-917.

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3.4.5.2 Corrosion-resisting metals. The following commonly used metals when properly applied are considered to be inherently corrosion-resistant without further processing:

- (a) Brass
- (b) Bronze
- (c) Copper
- (d) Copper-nickel alloy
- (e) Copper-beryllium alloy
- (f) Copper-nickel-zinc alloy
- (g) Nickel-copper alloy
- (h) Nickel-copper-silicon alloy
- (i) Nickel-copper-aluminum alloy
- (j) Austenitic steels, AISI types 202, 302, 303, 304, 304L, 309, 310, 316, 316L, 321, 324A, 347

3.4.5.3 Aluminum. Aluminum alloy shall be used insofar as practicable. Aluminum alloys, except castings, shall conform to ASTM standards. Aluminum alloy casting shall be manufacturer's choice except sand castings and permanent mold castings shall conform to class 2B of MIL-C-6021. Grade shall be manufacturer's choice.

3.4.5.4 Nonferrous material (except aluminum). Nonferrous materials, except aluminum, shall conform to commercial standards.

3.4.6 Plastics. Plastic materials shall conform to the requirements of MIL-E-917. 3.4.2.1 and as specified hereinafter.

3.4.6.1 Uniformity. Plastic materials shall be free of defects such as blemishes, embedded particles, bubbles, scratches, and striations.

3.4.6.2 Mechanical parts. Whenever plastic materials are contemplated for mechanical applications as replacements or substitutes for metal parts, they shall meet the flammability characteristics specified in 3.4.2.1.

3.4.6.3 Thermoplastic materials. Plastics which melt or soften under test conditions imposed by the applicable specification sheet shall not be used.

3.4.6.4 Electrical insulating parts. Plastics used for electrical insulating parts shall be of the type specified hereinafter.

3.4.6.4.1 Plastics, laminated. Laminated plastic material shall be a glass cloth bonded with melamine resin, in accordance with type GME of MIL-P-15037. No other laminated plastic material shall be used for electrical insulation. All cut surfaces of laminated plastic shall be given two coats of varnish in accordance with MIL-V-173 to prevent absorption of moisture.

3.4.6.4.2 Thermosetting, molded. Thermosetting, molded insulated parts shall conform to type MAI-60 or type MMI-30 of MIL-M-14.

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3.4.7 Springs. Material for springs, retaining clips, and retaining rings shall be as specified in the applicable specification sheets. Design of springs shall conform to requirement 41 of MIL-STD-454.

3.4.8 Magnetic permeability. The magnetic permeability of all surfaces of completed fixtures shall be 2.0 or less, after fabrication when tested as specified in 4.8.18. Unless otherwise specified (see 3.1 and 6.2.1), the magnetic permeability requirements shall not apply to shock mounts and fastening devices such as rivets and screws.

3.5 Parts and features - mechanical.

3.5.1 Hardware. Unless otherwise specified on the applicable specification sheet all hardware (bolts, nuts, screws, washers, and miscellaneous hardware) shall be of a good commercial grade material compatible with that of the basic fixture. Steel (corrosion-resisting steel excepted) hardware shall be zinc plated.

3.5.2 Dimensions and tolerances. Dimensions shall be as shown on the applicable specification sheet. Unless otherwise specified in the applicable specification sheet, the following tolerances shall apply:

- (a) Fractional dimensions - Plus or minus 1/64 inch.
- (b) Decimal dimensions - Plus or minus 0.005 inch.
- (c) Angular dimensions - Plus or minus 0 degree 15 minutes.

Unless otherwise specified in the applicable specification sheet a tolerance of plus or minus 1/32 inch is acceptable on fractional dimensions that are controlled by welding, brazing, and shockmounts. This wider tolerance shall not interfere with the interchangeability of assemblies or parts.

3.5.3 Assembly fabrication. Assembled fixtures shall have no loose parts, subassemblies, baffles, and so forth, that will rattle or detract from their quiet operation during vibration tests, or from transmitted vibration under operating conditions of the ship. Auxiliary dampening materials shall not be used for cushioning parts, wiring, and so forth, to achieve acceptable quiet operation. Rivets, pads, brackets, assemblies, and subassemblies, shall be securely attached to prevent rotation, rattling, turning, or bending. No loosening of these items shall be evident at the conclusion of the shock and vibration tests specified in 4.8.7 and 4.8.8.

3.5.4 Drilling, countersinking, and tapping. All drilling, countersinking, and tapping shall be done before plating or finish is applied. Tapped holes that are used for normal replacement of parts (windows, cover plates and so forth) shall be countersunk.

3.5.5 Sharp edges. All sharp edges and corners that are accessible shall be given a slight radius.

3.5.6 Castings and molded parts. Castings shall be free from cold shuts, blow holes, or any imperfections that may affect strength. All surfaces of castings shall have burrs and fins removed. Flash shall be removed from molded parts.

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3.5.7 Surface textures. All surface textures specified on the applicable specification sheet shall be in accordance with ANSI B46.1. Surface texture symbols are in accordance with ANSI Y14.36.

3.5.8 Threaded parts and devices.

3.5.8.1 Threads. Threads for all threaded fastening devices shall conform to FED-STD-H28. The threads shall be right hand, coarse-thread series, unified thread form, class 2A or 2B or American National thread form, class 2. Other thread series and classes, such as fine thread, may be used where it is necessary to assure functional operation of the equipment. Threads shall be checked during production run with "GO" and "NO GO" gages to insure conformance to FED-STD-H28.

3.5.8.2 Engagement of threaded parts. All threaded parts shall engage by at least four full threads in soft metals like aluminum and aluminum alloys. A minimum of three full threads shall be used in harder materials such as brass or steel. When a screw mates with a plastic part, a threaded metal insert shall be molded therein (pressed-in inserts are not acceptable), except as specified in 3.5.8.4.

3.5.8.3 Thread cutting screws. Thread cutting screws (sheet metal screws and self-tapping screws that remove material while cutting the thread) shall not be used. Thread forming screws (self-tapping screws that compress the parent material around the engagement hole while forming the thread) are acceptable.

3.5.8.4 Threads in plastics. Threads shall not be employed in plastic parts without the use of threaded metallic inserts, except in instances where the use of the inserts would adversely affect the electrical or mechanical characteristics of the part. Inserts shall be secured by knurling or other method which will prevent their movement in the plastic material.

3.5.8.5 Threads in aluminum. In general, threads in aluminum alloys shall not be used. Wherever practicable, through bolt holes shall be used. Inserts in aluminum shall be provided only where screws or bolts must be removed for routine maintenance of the equipment or where maximum stress in the screw or bolt is required for alignment of a vital part. Inserts in aluminum shall not be provided for securing identification or information plates, terminal boards or other items that are removed only when equipment is modified. Inserts shall be of austenitic corrosion-resistant steel.

3.5.8.6 Anti-seizure coating. Aluminum and steel fastening parts (screws, bolts, and so forth) in contact with threaded aluminum shall be coated with an anti-seize compound.

3.5.8.7 Thread locking. Unless otherwise specified herein, all nuts, bolts, studs, and screws shall be secured by a locking device. Satisfactory locking devices are split ring type lock washers, nut and lock nut, self-locking nuts, and castellated nuts with cotter pin or safety wiring. Internal tooth type lockwashers generally shall not be used. External tooth type lockwashers may be used where the weight of the part

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does not exceed 6 ounces per screw. Nuts or screws with captive lock washers may be used provided they are replaceable with common type screws and lockwashers. Ovalhead screws, when used with cup-type washers, and pan head screws on identification plates do not require locking devices. Thread forming screws do not require locking devices. When a bonding agent is used to permanently secure two or more threaded fastening devices, an over-sized thread may be used to provide a stronger bond. The over-sized threads shall be checked during the production run with "GO" and "NO-GO" gages to insure conformance to the original established dimensional limits.

3.5.9 Seals and special screws. Lead seals or special screws which require a special tool (see 3.10.1) for removal shall be used for explosion proof and combined explosion proof-watertight portable fixtures. Seals or special screws used shall be as approved by NAVSEA.

3.5.10 Gaskets. Unless otherwise specified on the applicable specification sheet, gaskets shall be in accordance with 3.5.10.1 through 3.5.10.4.

3.5.10.1 Window gaskets for type I, class 2 fixtures and lights. Window gaskets for type I, class 2, fixtures and lights shall be neoprene tubing (45-55 durometer hardness); 0.295 inch maximum and 0.245 inch minimum outside diameter (o.d.); 0.062 inch inside diameter (i.d.). No petroleum or silicon base lubricants shall be used when extruding gasket. Gaskets shall be securely cemented at the scarf joint and shall completely fill the groove without stretching or bunching. Gaskets shall be retained in their grooves without resorting to cement. Retainer may be continuous. (See 3.5.11.6 for gasket groove.)

3.5.10.2 "O"-ring gaskets. Unless otherwise specified in the applicable specification sheet, "O"-ring gaskets shall be commercial neoprene (65-75 durometer hardness). No petroleum or silicon base lubricants shall be used when molding gaskets. Sizes of "O"-ring gaskets for window assemblies shall be as shown on figures 1, 2 and 4.

3.5.10.3 "U"-shaped gaskets. "U"-shaped gaskets for PAR lamps roundels and lenses shall be commercial neoprene rubber (45-55 durometer hardness) of a continuous band and of circumference less than the diameter of the PAR lamp, roundel or lens. No petroleum or silicon base lubricants shall be used when molding gaskets. The gaskets shall be so arranged that when stretched over the PAR lamp, roundel, or lens, the material will form over the edge and the faces of the PAR lamp, roundel or lens to form a "U"-shaped gasket.

3.5.10.4 Gasket coating. All "O"-ring and tubular gaskets shall be coated with a lubricant, Penetone Div. P/N "Lube #806", Amerace Corp., 74 Hudson Ave., Tenafly, NJ or equivalent; before final assembly in the fixtures.

3.5.11 Enclosures. Enclosures shall be in accordance with 3.5.11.1 through 3.5.11.6, as specified on the applicable specification sheet. There shall be no evidence of failure when fixtures and parts are tested in accordance with 4.8.14 to determine effectiveness of the enclosures.

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3.5.11.1 Enclosures, type I, class 1. Enclosures for type I, class 1, fixtures shall be as specified on the applicable specification sheet. Minimum thickness of aluminum, where used, shall be not less than 0.090 inch, unless otherwise specified on the applicable specification sheet. Grade of materials where not specified shall be manufacturer's choice.

3.5.11.2 Enclosures, type I, class 2. Enclosures for type I, class 2, fixtures shall be as specified on the applicable specification sheet. The enclosures shall be made of aluminum. The enclosures may be fabricated. Aluminum or zinc die cast ends may be used in assembly with sheet aluminum mid-section. Die cast ends shall not be in direct contact with the shockmounts. Grade of aluminum used shall be manufacturer's choice. Unless otherwise specified on the applicable specification sheet, minimum thickness of aluminum shall be not less than 0.090 inch. For personnel safety while cleaning or relamping fixture, a small compartment with removable cover shall be provided at each end within the enclosure for the purpose of containing the necessary parts and wiring connections. Areas in way of shockmount bolts shall be indented to receive gaskets and shockmounts as shown on figure 6. The enclosure shall be sufficiently rigid to assure effective alignment and closure between enclosure and lens upon completion of shock tests conducted on assembled fixtures. Cable entrance hole shall be size and shape to suit style of cable entrance fitting.

3.5.11.3 Enclosures, type II, classes 1 and 2. Enclosures for type II, classes 1 and 2, fixtures and lights shall be as specified on the applicable specification sheet.

3.5.11.4 Parts. Enclosures shall incorporate all parts specified in the applicable specification sheet. Parts shall be firmly attached to the enclosure.

3.5.11.5 Drainage. When specified on the applicable specification sheet, enclosures shall provide for drainage of water vapor condensation through drain holes or other means located so as to provide for maximum drainage when fixtures and light are mounted in their normal operating position.

3.5.11.6 Gasket groove. Gasket groove for watertight type I, class 2 fixtures and lights shall be as shown on figure 7.

3.5.12 Shock. Fixtures and parts, as specified in 3.5.12.1 through 3.5.12.3, shall withstand, without damage or loosening of parts, the shock test specified in 4.8.7.

3.5.12.1 Types I and II, class 1 fixtures. Unless otherwise specified on the applicable specification sheet, types I and II, class 1 fixtures shall withstand the high impact (H.I.) shock for grade B, type A equipment in accordance with MIL-S-901.

3.5.12.2 Types I and II, class 2 fixtures. Unless otherwise specified on the applicable specification sheet, types I and II, class 2 fixtures shall withstand the high impact (H.I.) shock for grade A, type A equipment in accordance with MIL-S-901. Type I lamps shall show no permanent loss of illumination during shock test. Failure of the type II lamp filament does not constitute failure of the fixture tested.

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3.5.12.3 Parts. When specified on the applicable specification sheet, parts shall withstand the shock test specified for the basic fixture in which they are used (see 3.5.12.1 and 3.5.12.2).

3.5.13 Vibration. When specified on the applicable specification sheet, fixtures and parts shall withstand, without damage or loosening of parts, the type I vibration test in accordance with MIL-STD-167-1 as specified in 4.8.8. Use of locking devices is satisfactory to prevent loosening of parts. Type I lamps shall show no permanent loss of illumination during the vibration test. Failure of type II lamp filament does not constitute failure of fixture tested.

3.5.14 Noise. When specified in the applicable specification sheet, fixtures, lights or parts shall not exceed the sound pressure level of 28 decibels (dB) referenced to 0.0002 microbars or the sound pressure level specified in the applicable specification sheet for airborne noise only when tested as specified in 4.8.9.

3.5.15 Salt spray. When specified on the applicable specification sheet, fixtures and parts made of steel or aluminum for weather deck installation shall withstand the salt spray test specified in 4.8.10 without 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 passed through the plating and attacked the base metal.

3.5.16 Shockmounts. Shockmounts shall be furnished as specified on the applicable specification sheet, except that thickness of material shall be manufacturer's choice if failure occurs under the shock and vibration tests.

3.5.17 Ambient temperature. The fixtures, lights and parts shall be capable of operating in the temperature specified on the applicable specification sheet when tested as specified in 4.8.19.

3.6 Parts and features - electrical.

3.6.1 Safety. Fixtures and parts shall be constructed in a way that will ensure safety to operating and maintenance personnel. When properly installed and the enclosure is grounded, there shall be no accessible way for operating personnel to receive an electric shock even though an internal fault between two circuits, between any circuit and a structural member, or between any circuit and ground may exist. The design shall hold to a practical minimum the possibility of maintenance personnel being exposed to electric shock while servicing, adjusting, or checking out the fixtures or parts.

3.6.2 Lamps. Unless otherwise specified (see 6.2.1), lamps for type II fixtures shall not be furnished. Lamps for type I fixtures shall be as specified on the applicable specification sheet and shall be furnished assembled in the fixture.

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3.6.3 Lamplocks for type I fixtures. Lamplocks for type I fixtures shall be as specified on the applicable specification sheet and shall be furnished assembled in the fixture. Lamplocks shall provide for maximum protection against lamp loosening or rotation under the shock and vibration tests.

3.6.4 Lampholders. Lampholders shall be in accordance with MIL-L-970 and as specified hereinafter. The type shall be as specified on the applicable specification sheet.

3.6.4.1 Lampholder spacing for type I fixtures and lights. Unless otherwise specified on the applicable specification sheet, spacing between faces of lampholder supports at the point of lampholder attachment for type I fixtures and lights shall be as shown on figure 21.

3.6.4.2 Insulating spacer for type II fixtures and lights. An insulating spacer shall be installed between the lampholder metal mounting base and the lampholder in the case where the lampholder is provided with screws or other devices for electrical connections that are exposed to the mounting base. Material shall be as specified in 3.4.6.4. Counter-bored holes in bottom of lampholders or insulated bases shall not be filled with sealing wax or with rosin after screws are in place.

3.6.5 Starter sockets for type I fixtures and lights. Starter sockets for type I fixtures and lights shall be in accordance with MIL-L-970. The type shall be as specified on the applicable specification sheet.

3.6.6 Starters for type I fixtures and lights. When specified in the applicable specification sheet, starters for type I fixtures and lights shall be as listed in table II. Unless otherwise specified (see 6.2.1), the type to be furnished shall be as specified in the applicable specification sheet, and shall be furnished assembled in the fixture or light. The interior of starters shall be filled with wax, in cases where used in fluorescent lights having explosion proof requirements. Starters shall be furnished with ceramic condenser to reduce starting electromagnetic noise and with a paper sleeve inside the starter can to reduce noise from vibration of interior parts against can.

TABLE II. Starters.

Voltage	Description	Fluorescent lamp	
		6 - 8 watts	15 - 20 watts
Alternating current	Item name	Simple glow switch without lockout	Simple glow switch, without lockout
	Specification	Type III of W-S-755	Type III of W-S-755
	Commercial designation	FS-5	FS-2
	National stock number	6250-00-299-5962	6250-00-299-2884
Direct current	Item name	Thermal switch without lockout	Thermal switch without lockout
	Specification	Type IV of W-S-755	Type IV of W-S-755
	Commercial designation	AT-58	AT-2
	National stock number	6250-00-283-9904	6250-00-884-2103

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3.6.7 Starter washers for type I fixtures and lights. Starter washers in accordance with figure 5 shall be provided for type I, classes 1 and 2 fixtures and lights that are furnished with starters (see 3.6.6). The washer shall be slipped over contacts of the starter. The washer and starter shall then be inserted into the starter socket and rotated to lock in the normal manner to provide a snug, rattle-free fit.

3.6.8 Ballasts for type I fixtures and lights. Ballasts for type I fixtures and lights shall be as specified on the applicable specification sheet and hereinafter.

3.6.8.1 Mounting. Ballasts shall be mounted so that they will not become loose under the shock and vibration tests. Ballast mounting shall make good contact with the fixture housing so as to aid conduction of normal operating heat away from the ballast to reduce noise. Ballasts shall be secured only by bolts (machine screws) and shall be capable of ready removal for replacement.

3.6.9 Terminal boards. Unless otherwise specified on the individual specification sheet, terminal boards shall be in accordance with MIL-T-55164. The type shall be as specified on the applicable specification sheet.

3.6.9.1 Mounting. Terminal boards for receiving ships cable shall be secured to a fixed portion of the enclosure, not to movable assemblies that may require flexing of the ship's wiring during normal operation, maintenance, or servicing. Terminal boards shall be mounted so that they will not be broken or stressed by distortion of the enclosure. Terminal boards shall be secured only by bolts (machine screws) and shall be capable of ready removal and replacement.

3.6.10 Switches. When specified (see 6.2.1), switches shall be furnished in accordance with the applicable specification sheet and as specified hereinafter.

3.6.10.1 Toggle switches. Double pole single-throw (DPST) switches shall conform to MS16569. Single pole single throw (SPST) switches shall conform to MS16656.

3.6.10.2 Push-button switches. Push-button switches shall be as specified on the applicable specification sheet.

3.6.10.3 Boots. Rubber boots in accordance with MIL-B-5423 shall be used to achieve the degree of enclosure effectiveness specified on the applicable specification sheet. Unless otherwise specified on the applicable specification sheet, type and style of boot shall be manufacturer's choice.

3.6.11 Wiring. All necessary internal wiring shall be furnished and installed. Connections at screw terminals shall be made with pressure grip (solderless) connectors, in accordance with U.L. Publication UL-486. Splice connections shall be kept to a minimum and shall be made with U.L. approved insulated connectors, either crimp or screw type. Wires parallel to lamps in type I fixtures shall be run in a conduit, or shall be confined between reflector and housing. There shall be no exposed uninsulated electrical terminal joints, junctions, wiring, wiring accessories, and so forth.

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3.6.11.1 Hook-up wires. All wire shall be of stranded soft annealed copper of suitable cross section to provide ample and safe current carrying capacity and mechanical strength.

3.6.11.2 Harnessing. All wiring shall be neatly formed into groups which shall be laced, tied, taped or clamped in a manner that provides support and prevents chafing of the wire insulation due to vibration and shock.

3.6.11.3 Insulation protection. Where wires are run through holes in metal partitions these holes shall be furnished with grommets for the mechanical protection of insulation which otherwise could be subject to abrasion. Care shall be exercised in the running of wires to insure that they are not carried over or bent around any sharp corner or edge.

3.6.12 Cable and cable entrances. Cable shall be as specified on the applicable specification sheet. Commercial type cables for types I and II, class 1 fixtures shall be in accordance with J-C-580 with conductor color coding as specified in table entitled "Color codes for cords of 4 to 10 conductors". Commercial type cables for types I and II, class 2 fixtures shall be in accordance with J-C-580 except that standard identification code for conductors shall be as shown in table entitled "Armor braid angle" of MIL-C-915. Cable length shall be measured from the cable entrance of fixture, light, or part to the end of the cable. A cable length tolerance of plus or minus 3 inches shall apply. The following stuffing tubes or box connectors shall be used as cable entrance:

- (a) Stuffing tubes, stuffing tube assemblies, and stuffing tube parts shall be in accordance with MIL-S-19622 unless otherwise specified on the applicable specification sheet. Holes for stuffing tubes shall be smooth and true without any distortion of the box. Packing assembly and packing nut in accordance with MIL-S-19622 shall be used when cable entrances are integral with the housing.
- (b) Box connectors shall be type I in accordance with W-F-406. Grade and style shall be as specified on the applicable specification sheet. Box connectors shall not be used in watertight fixtures or parts.

3.6.13 Ground potential and grounding.

3.6.13.1 Electrical circuits. Fixtures and parts shall operate satisfactorily on an ungrounded ship's power system. The design shall be such that it does not impose a ground upon the electrical power system from which it is energized. Wiring shall be as specified on the applicable specification sheet.

3.6.13.2 Exposed metal (or other conductive) parts. Construction of fixtures and parts shall be such that all exposed parts of metal or other electrically conductive material are at ground (ship's hull) potential at all times. Exposed metal portions of electrical parts (switches, lampholders, and so forth) or other parts located near electrical circuits (including parts inside enclosures where access is required for operation

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or adjustment) shall be in intimate physical contact with the frame of the equipment or electrically connected to the frame if these parts could touch the electrical circuits as a result of deformation, wear, insulation failure, and so forth.

3.6.13.3 Ground connection. Fixtures provided with a grounding conductor (green or red) in the supply cable shall have the end of that conductor, terminating within the fixture, securely attached and electrically connected to the metallic or conducting structure most likely to contact the body. This shall be accomplished in such a manner that all exposed metallic or conducting parts shall make adequate electrical contact with the grounding conductor when tested in accordance with 4.8.11.

3.6.13.4 Continuity of grounding. Fixtures and parts provided with shockmounts shall not exceed 0.10 ohm impedance between protruding tip of shockmount and any remote internal metallic structure of housing assembly when tested in accordance with 4.8.12. Shockmounts shall not be painted.

3.6.13.5 Portable fixtures. The leakage current of the portable fixtures shall not exceed 5 milliamperes. Leakage current is defined as the peak value of current flowing through the connection when any line of the power source is connected to the frame of the fixture for test purposes with fixture operating. Leakage current shall be measured as specified in 4.8.13.

3.6.14 Electromagnetic interference (emission and susceptibility) (type I only). When specified in the contract (see 6.2.1 and 6.10), electromagnetic interference requirements for type I fixtures shall conform to the requirements of this specification when tested as specified in 4.8.16.

3.6.15 Dielectric withstanding voltage. There shall be no evidence of breakdown, arcing, corona, (audible or visible) or punctured insulation when the interior of the fixture or part is subjected to the test specified in 4.8.2.

3.6.16 Insulating resistance. The insulation resistance between all current-carrying and noncurrent-carrying parts of fixtures or parts shall be not less than 1 megohm, when tested in accordance with 4.8.3.

3.7 Light output and associated hardware.

3.7.1 Candlepower distribution for fixtures. Candlepower distribution curves shall be symmetrical to and shall be within plus or minus 10 percent of the curves shown on the applicable specification sheet. Tests shall be conducted as specified in 4.8.6.

3.7.2 Footcandle distribution for fixtures. Footcandle distribution curves shall be symmetrical to and shall be not less than 90 percent of the curves as shown on the applicable specification sheet. Tests shall be conducted as specified in 4.8.6.

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3.7.3 Color (chromaticity) and luminous transmittance for parts.

The chromaticity in CIE coordinates and luminous transmittance for parts such as windows, globes, roundels, lenses, filters, and others shall be in accordance with the applicable specification sheet and as specified hereinafter. Color and luminous transmittance of plasticware parts shall be in accordance with MIL-P-24191. Color and luminous transmittance requirements shall be met prior to application of any diffusing process. If stippling, is used for diffusing, the stippled surface shall be ground down and polished to a smooth surface or a test specimen shall be molded to a smooth surface of a nominal thickness as shown on the specification sheet for the part to be tested.

3.7.3.1 Red transparent. Red transparent color shall fall within the area bounded by the spectrum locus and $y = 0.335$, $X = 0.985 - y$ as shown on figure 8. Red glassware shall have a light transmission value that essentially follows the curves shown on figure 9 when specimens are tested as specified in 4.8.6.

3.7.3.2 Yellow transparent. Yellow transparent color shall fall within the areas bounded by the spectrum locus and

$$\begin{aligned} y &= 0.382 & x &= 0.454 + 0.240y \\ y &= 0.790 - 0.667x & x &= 0.698 - 0.333y \end{aligned}$$

as shown on figure 8. Luminous transmittance, using CIE illuminant A, shall be not less than 50 percent when specimens are tested as specified in 4.8.6.

3.7.3.3 Green transparent. Green transparent color shall fall within the area bounded by the spectrum locus and

$$\begin{aligned} y &= 0.390 - 0.171x & x &= 0.360 - 0.080y \\ & & x &= 0.650y - 0.030 \end{aligned}$$

as shown on figure 8. Luminous transmittance, using CIE illuminant A, shall be not less than 20 percent when specimens are tested as specified in 4.8.6.

3.7.3.4 Blue transparent. Blue transparent color shall fall within the area bounded by the spectrum locus and

$$\begin{aligned} y &= 0.230 & x &= 0.133 + 0.600y \\ & & x &= 0.400 - y \end{aligned}$$

as shown on figure 8. Luminous transmittance, using CIE illuminant A, shall be not less than 2 percent when specimens are tested as specified in 4.8.6.

3.7.3.5 White translucent. White translucent, when tested as specified in 4.8.6, shall have luminous transmittance as specified on the applicable specification sheet. Transmitted light shall be distributed uniformly through the plastic.

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3.7.3.6 Red translucent. Red translucent color shall fall within the area bounded by the spectrum locus and $y = 0.335$, $x = 0.085 - y$, as shown on figure 8. Red material shall have a light transmission value that essentially follows the curve shown on figure 9 when tested as specified in 4.8.6.

3.7.3.7 Clear (colorless) transparent. The light transmitted by clear transparent ware shall not be noticeably different in chromaticity from that of the illuminant. Luminous transmittance shall be not less than the value specified on the applicable specification sheet. Clear transparent ware shall transmit all light between wave length 420 nanometers (nm) (violet) and 680 nm (red). Selective absorption at any wave length shall not exceed 5 percent of the entire energy at that wave length of the light source.

3.7.4 Windows and window assemblies for type I fixtures and lights. Windows and window assemblies shall be as specified on the applicable specification sheet and hereinafter. Finish shall be as specified in 3.8.4.1. Annealing shall be as specified in 3.8.5.3. Typical styles of window assemblies are shown on figure 10.

3.7.4.1 Material for windows. Material for windows shall be cast acrylic plastic sheet in accordance with MIL-P-24191 of a type and grade as specified on the applicable specification sheet. The requirements of MIL-P-24191 shall apply to the flat material prior to forming or fabrication. Windows after forming or fabrication shall be as specified on the applicable specification sheet. Injection molded, or extruded material is not permitted for parts that are formed to a specific shape. Flat windows may be made from extruded sheet.

3.7.4.1.1 Optical uniformity. The plastic windows shall have the best optical uniformity. Windows shall be free from defects such as imbedded particles, bubbles, scratches, blemishes, and striation, such as will seriously affect the optical properties.

3.7.4.1.2 Corners. In the process of fabrication of windows, the three-sided corners shall not be reduced in excess of 30 percent of the nominal window thickness specified in the applicable specification sheet. This wider tolerance shall be limited to an area bounded by the hypotenuse of three right-angled triangles, $3/4$ by $3/4$ inch, placed so that their vertex is at the point of the outside surface of the corner.

3.7.4.2 Louwer assembly. The louwer assembly shall be as specified on the applicable specification sheet and hereinafter. Finish shall be as specified in 3.8.4.2.

3.7.4.2.1 Material. Material for louwer assemblies shall be aluminum. Mounting hardware and grounding straps are excluded.

3.7.4.2.2 Attachment to window. The louwer assembly shall be attached to window in accordance with figure 4 for attaching louwers to watertight plastic windows.

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3.7.4.2.3 Louver grounding. The louver assembly shall be grounded to fixture housing through the mounting screws. Louver grounding shall be continuous from one mounting screw to the other.

3.7.4.3 Window securing screw assemblies. Windows shall be provided with window securing screw assemblies in accordance with figures 1, 2, and 3. The type and number to be provided shall be as specified on the applicable specification sheet. When window assemblies are purchased separately for replacement parts, the following procedures shall be followed (this does not apply to windows shown on MIL-F-16377/18, MIL-F-16377/65, and MIL-F-16377/66):

- (a) The center securing screw assembly(ies) (all except those at the two extreme ends) shall be snugly fitted with a flat washer, a lockwasher, and a nut as shown on figures 1 and 2. (Note: This arrangement allows the windows to be used with the previous design of non-watertight fixtures.)
- (b) A type VI label shall be provided with each window assembly as specified in 3.9.1.8.6.

3.7.4.4 Notches. When dimples or pins, in accordance with figure 6, are used to retain window gasket in its groove, notches to clear these dimples or pins shall be filed on the sides of the window as shown on the applicable specification sheet and figure 27. Notches are not required when a continuous gasket retainer is used. Notches are required on windows when they are furnished separately from the lighting fixtures as replacement parts.

3.7.5 Lenses, globes, roundels, and windows for type II fixtures. Plastic lenses and windows shall be as specified on the applicable specification sheet. Glass lenses, globes, roundels and windows, referred hereinafter as glassware, shall be as specified on the applicable specification sheet and hereinafter.

3.7.5.1 Optical uniformity. Glassware shall be free from defects that will prevent conformance with the light output requirements specified on the applicable specification sheet. Finished glassware shall be free from air bubbles, striae, wrinkles, mold marks, chipped edges, or any other blemishes which may affect the optical qualities.

3.7.5.2 Material. Glassware shall be made of high-impact, heat resistant glass of a type that will withstand all requirements specified on the applicable specification sheet. The glass shall be of such composition and quality as to withstand exposure to atmospheric sea conditions particularly that of salt water, high humidity and bright sunlight, without etching, discoloration or any change in the light transmittance. Flashed glass shall not be used.

3.7.5.3 Edges. The edges of all glassware shall be ground or molded to a true surface.

3.7.5.4 Colored glassware. All colored glassware shall be colored material throughout the entire thickness of the portions designed for light transmission.

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3.7.5.5 Painted glassware. Those portions of the glassware designated by the applicable specification sheet to be painted shall be uniformly coated with an inorganic baking enamel. The color shall be as specified on the applicable specification sheet. The glassware shall be baked at such a temperature and for such a period of time as to insure adhesion of the enamel to the glass. There shall be no evidence of loosening or softening or other dissolution of the enamel when glassware is tested as specified in 4.8.17.2.

3.7.5.6 Mechanical shock. Glassware shall be resistant to one impact of a free falling 3-pound polished steel ball striking the glassware as specified in 4.8.17.2.

3.7.5.7 Thermal shock. Glassware shall withstand the stresses produced when tested as specified in 4.8.17.4 without visible or structural damage.

3.7.5.8 External hydrostatic pressure. Glassware shall withstand the stresses produced when tested as specified in 4.8.17.5 without visible or structural damage.

3.7.5.9 Breakage pattern. Breakage pattern shall be characterized by complete fracture of the glassware into small rectangular pieces predominantly not exceeding 2-1/2 by 5/8-inches when tested as specified in 4.8.17.6.

3.7.6 Reflectors. Reflectors shall be as specified on the applicable specification sheet, or of the size and shape necessary to produce the distribution curve, required (see 3.7.1 and 3.7.2). Reflectors shall be made of aluminum sheet (manufacturer's choice) not less than 0.019 inch thick. Reflectors shall be reinforced to prevent noise when a fixture is tested in accordance with 4.8.9. Clearance of holes of a size to accept the socket wrench for 1/4-20 hexagon nut shall be cut in the reflector where necessary to facilitate replacement of snockmounts in type I, class 2 fixtures. The holes shall align with snockmount hexagon nuts when the reflector is assembled in the enclosure. For finish of reflectors, see 3.8.3. Material for specular reflectors shall be aluminum pre-finished lighting sheet having a specular reflectance factor of not less than 80 percent. Plastic coating for specular reflecting surface is not acceptable.

3.7.7 Filters. Colored filters shall be as specified on the applicable specification sheet and hereinafter.

3.7.7.1 Red filter tubes for type I, class 2 fixtures. When specified (see 6.2.1), or when required by the applicable specification sheet, red filter tubes for insertion over type I lamps for use in red illumination shall be furnished installed in the fixtures. The procedures specified hereinafter shall apply when red filter tubes are installed in the type I standard fixtures. No symbol numbers or national stock numbers will be assigned for these fixtures.

3.7.7.1.1 "(R)" shall be placed next to the symbol number specified on the applicable specification sheet to signify an all red fixture—that is, red filter tubes have been installed on all lamps.

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3.7.7.1.2 "(R&W)" shall be placed next to the symbol number specified on the applicable specification sheet to signify a combination red and white fixture that is, a red filter tube has been installed on one lamp of a two lamp fixture or on the center lamp of a three lamp fixture.

3.7.7.1.3 "(2R&W)" shall be placed next to the symbol number specified on the applicable specification sheet to signify a combination red and white fixture that is, that red filter tubes have been installed on the two outer lamps of a three lamp fixture.

3.7.7.1.4 Installation of red filter tubes in directional fixtures shall be as specified on the applicable specification sheet. "(R&W)" shall be placed next to the symbol number specified on the applicable specification sheet to signify combination red and white fixture.

3.7.7.2 Blue filter tubes for type I fixtures. Identical requirements specified in 3.7.7.1 apply except blue (B) is substituted for red (R).

3.8 Processes.

3.8.1 Treatment and processing of metals for corrosion-resistance. The treatment and processing of metals for corrosion-resistance shall conform to the requirements of MIL-E-917.

3.8.2 Painting. Painting of metals to obtain corrosion-resistance shall conform to the requirements of MIL-E-917.

3.8.3 Finishing for fixtures and parts. When the salt spray test is specified on the applicable specification sheet, the procedures of 3.8.1 and 3.8.2 for finishing fixtures and parts for corrosion-resistance shall be strictly followed. When the salt spray test is not specified on the applicable specification sheet, the procedures for finishing fixtures specified hereinafter shall apply.

3.8.3.1 Cleaning. Cleaning shall be in accordance with the best commercial practice.

3.8.3.2 Surface preparation. The surface of metal parts shall be prepared for painting in accordance with the best commercial practice. This operation may be combined with the cleaning specified in 3.8.3.1.

3.8.3.3 Finish. Final finish shall be baking enamel of a good commercial grade. Color shall be as specified in 3.8.3.4 through 3.8.3.6.

3.8.3.4 Types I and II, class 1, fixtures. Unless otherwise specified on the applicable specification sheet, the color of the final finish applied to all exterior surfaces of types I and II, class 1, fixtures shall be a light gray in accordance with color number 16492 of FED-STD-595; the color of the final finish applied to all reflecting interior surfaces shall be white in accordance with color number 17875 of FED-STD-595, having a reflectance factor of not less than 80 percent. Specular reflectors shall not be painted (see 3.7.6).

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3.8.3.5 Types I and II, class 2, fixtures. Unless otherwise specified on the applicable specification sheet, all external and reflecting surfaces of types I and II, class 2, fixtures shall be white in accordance with color number 17875 of FED-STD-595, having a reflectance factor of not less than 80 percent. Specular reflectors shall not be painted (see 3.7.6).

3.8.3.6 Parts. Unless otherwise specified on the applicable specification sheet, parts shall be painted a light gray in accordance with color number 16492 of FED-STD-595.

3.8.4 Finishing for windows and window assemblies for type I fixtures. Finishing for windows and window assemblies for type I fixtures shall be as specified on the applicable specification sheet and hereinafter.

3.8.4.1 Windows. Surfaces of areas indicated by the applicable specification sheet to be finished shall be finished with air dry acrylic lacquer as follows:

- (a) White finish: Highly diffusing white. Luminous transmittance of the finished surface shall be 60 ± 10 percent.
- (b) Black finish: Flat black. Surfaces shall be completely covered so that no pinholes or other blemishes exist.
- (c) Frosted finish: Clear frosted. Luminous transmittance of the finished surface shall be 65 ± 10 percent.

3.8.4.2 Louver assemblies. After surface preparation (see 3.8.3.2), the final finish for louver assemblies shall be baking enamel of a good commercial grade. The color shall be as follows:

- (a) White louvers: White in accordance with color number 17875 of FED-STD-595, having a reflectance factor of not less than 80 percent.
- (b) Black louvers: Dull camera black.

3.8.4.3 Antistatic coating. Antistatic coating shall be applied to all unfinished surfaces of the window assemblies.

3.8.5 Stress relief.

3.8.5.1 Stress-corrosion cracking of metals. Stress-corrosion cracking characteristics are of primary concern in material selection for marine service. High residual stresses in tension in certain materials can cause stress-corrosion cracking when it is exposed to corrosive environment. Stress-corrosion cracking occurs under tensile stresses which are induced into metal parts that are formed by bending or drawing or that are fabricated by welding or torch welding. All susceptible metal parts under tensile stress shall be stress relieved to prevent deterioration or failure. Method of stress relieving shall be manufacturer's choice as required by the technical data furnished by the supplier of the raw material.

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3.8.5.2 Plastics. Adequate measures shall be taken in molding or processing plastics to insure that stress build-up does not occur or is satisfactorily treated to relieve these stresses to prevent deterioration or failure of a part or assembly. The stress-relieving process shall be as required by the technical data furnished by the contractor of the raw material.

3.8.5.3 Plastic windows for type I fixtures. Plastic windows for type I fixtures that are formed to a specified shape from sheet shall be annealed to relieve internal stresses after fabrication and finishing operations have been completed. After annealing, there shall be very little or no evidence of stress when window assemblies are tested as specified in 4.8.5. Very little stress is defined as that which does not interfere with the optical uniformity of the window, or in the case of window failure, stress which does not cause window cracking under the shock and vibration tests. Method of annealing shall be the manufacturer's choice as prescribed by the technical data furnished by the contractor of the raw material.

3.8.6 Welding. Welding and allied processes used in fabrication of fixtures and parts shall be in accordance with the best commercial practice. The American Welding Society Handbook shall be used as a guide.

3.9 Designation and marking. Labels, identification, information and warning plates, instruction sheets, tags and markings for fixtures and parts shall be as specified on the applicable specification sheet and hereinafter. Labels and identification plates are not required with plastic fixtures or parts where the specified information is molded in place.

3.9.1 Labels. Labels shall be furnished as specified hereinafter. Where advantageous, labels may be combined.

3.9.1.1 Material. The labels shall be of a grade of paper, fabric or plastic, flatback, coated on one side with pressure-sensitive adhesive. The texture of material shall be such as to permit flexibility and shall have a finish capable of withstanding normal usage of handling and installation.

3.9.1.2 Adhesive. The adhesive shall be a pressure-sensitive, permanent type. It shall be water-insoluble, homogeneous, and shall be coated in a smooth layer on one side of the label. The adhesive shall require no solvent, heat, or other preparation prior to application. Adhesive shall be of a type that will adhere to metal or plastic.

3.9.1.2.1 Adhesion. The label shall adhere to the clean, dry surfaces to which applied under normal pressure without curling, breaking, or lifting.

3.9.1.3 Color. Unless otherwise specified herein, the color of the labels shall be white or yellow.

3.9.1.4 Thickness. Thickness of material prior to coating with adhesive shall be sufficient to give structural body for printing and handling.

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3.9.1.5 Size. The size of labels shall be such as to accommodate the desired information.

3.9.1.6 Writing quality. Labels shall be suitable for printing or writing on with ink.

3.9.1.7 Marking. Marking in general, shall be with black waterproof ink. Other colors of ink may be used when contrast is desired. Nonwaterproof ink may be used, provided it is followed by the application of a transparent waterproof coating. Height of characters shall be approximately as shown on figure 11 for type I labels and not less than 1/16 inch for types II, III, IV and VI labels.

3.9.1.8 Application and classification. Unless otherwise specified on the applicable specification sheet, labels shall be applied as specified hereinafter. Labels shall be of the types specified hereinafter, as specified on the applicable specification sheet.

3.9.1.8.1 Type I labels. Type I label shall be for equipment identification and shall be as shown on figure 11. Unless otherwise specified on the applicable specification sheet, two type I labels shall be applied to each fixture; one located on the outside back surface and the other located on an inner nonreflecting surface.

3.9.1.8.2 Type II labels. Type II labels for use with type I fixtures that are provided with three (or more) conductor cables for either single white or red or combination white and red illumination shall be as shown on figure 12. Type II labels shall be applied on the outside surface adjacent to the cable entrance of each flush mounted fixture. For standard mounted fixtures and lights see 5.1.

3.9.1.8.3 Type III labels. Type III labels shall be used to indicate internal wiring of fixtures, and shall be as shown on figure 13, unless otherwise specified on the applicable specification sheet. Type III labels shall be applied as specified on the applicable specification sheet.

3.9.1.8.4 Type IV labels. Type IV labels shall be used for supplying information pertinent to the fixtures or parts, and shall be as shown on figure 14. The information to be imprinted thereon and the application to fixtures or parts shall be as specified on the applicable specification sheet.

3.9.1.8.5 Type V labels. Type V labels shall be as shown on figure 15, and shall be used for warning information. The warning information and the application to fixtures or parts shall be as specified on the applicable specification sheet.

3.9.1.8.6 Type VI labels. Type VI labels shall be as shown on figure 16. Unless otherwise specified on the applicable specification sheet, one type VI label shall be applied on the outside of each window assembly that is furnished as a replacement part for type I fixtures. The adhesive for these labels shall be of a pressure-sensitive type, that will allow the label to be easily removed (this does not apply to windows shown on MIL-F-16377/18, MIL-F-16377/65 or MIL-F-16377/66).

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3.9.2 Identification and information plates. When specified on the applicable specification sheet, identification and information plates shall be furnished in accordance with MIL-P-15024 and MIL-P-15024/5. Identification plates for use on fixtures that will be exposed to the weather shall be type A, B, C, D, or I, made from nickel-copper alloy, brass, or type H, made from anodized aluminum. Type E and G plates shall be used only for wiring diagrams and other plates that are housed within the equipment enclosure. Plastic type B plates shall have black inner (or record) laminations and gray cover laminations.

3.9.3 Warning plate. A warning plate in accordance with MIL-P-15024 and MIL-P-15024/5, bearing the following legend, in upper case letters, shall be provided for fixtures and lights having explosionproof or combined explosionproof-watertight enclosures:

"FOR USE IN THE FOLLOWING EXPLOSIVE
ATMOSPHERES: GASOLINE, PETROLEUM,
NAPHTHA, ALCOHOL, ACETONE, LACQUER
SOLVENT VAPORS, AND NATURAL GAS."

The warning plate shall be securely attached to the outside of the fixture where it can best be seen. Where space permits, this warning legend may be combined with the identification and information plate (see 3.9.2).

3.9.4 Instruction sheets, or tags. When specified on the applicable specification sheet, instruction sheets or tags providing pertinent design and installation information shall be furnished with the fixtures or parts.

3.10 Interchangeability and standardization.

3.10.1 Interchangeability. Each repair part shall be equal to the original and suitable for replacement without special tools. (Special tools are defined as those tools not listed in the Federal Supply Catalog. Copies of this catalog may be consulted in the office of the Defense Contract Administration Service Management Area (DCASMA)), and without the removal of rivets or pins dependent on a force fit. Mechanical and electrical interchangeability shall exist between like assemblies, sub-assemblies units, and replaceable parts, regardless of the manufacturer or contractor. Interchangeability does not mean identity, but requires that a substitution of such like assemblies, subassemblies, units and replaceable parts be easily affected without physical or electrical modifications to any parts of the lights or assemblies, including globes, lenses, roundels, lamps, lampolders, wiring, and mounting, and without resorting to selection.

3.10.2 Standardization.

3.10.2.1 Standardization of units, assemblies, subassemblies and parts shall be accomplished to as great an extent as practicable to simplify supply parts and replacement problems. Electrical and mechanical interchangeability of units, assemblies, subassemblies, and parts shall conform in detail to the various individual specification sheets.

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3.10.2.2 Equipment standardization. Progressive standardization of complete equipments is required, at least to the extent that similar articles of different manufacture are electrically and mechanically interchangeable. In order to accomplish maximum practical standardization, individual specification will include requirements as to mounting dimensions, limiting overall dimensions and electrical characteristics of individual items of equipment.

3.10.2.3 Standard stock parts. Standard stock parts and hardware shall be used to as great an extent as practicable. For the purpose of this specification, standard stock is defined as material listed in the Federal Supply Catalog and includes such items as globes, lenses, roundels, lamps, lampholders, cable, cord, wire, bolts, screws, nuts, and washers.

3.10.2.4 Proprietary parts. Where Navy standard stock parts are not suited for the purpose intended, parts and materials shall be used which are standard, easily obtainable, and produced by reliable manufacturers, as far as possible within the limits of this specification. In order to facilitate the acquisition of replacement parts, the design shall not be based upon the use of parts of special manufacture where (suitable) units of standard manufacture are available. Similarly, the design shall not be based on the use of parts produced by only one manufacturer when an equivalent design available from several sources of manufacture might be employed.

3.11 High temperature fluorescent lighting fixtures. When specified (see 6.2.1), the procedures specified hereinafter shall apply when high temperature fluorescent lighting fixtures are required.

3.11.1 Symbol numbers. A "HT" shall be placed next to the symbol number specified in the applicable specification sheets to indicate a high temperature modification of the standard lighting fixture. (Example: Symbol Number 77.4HT.)

3.11.2 Component substitution. Standard components specified in the applicable specification sheets shall be substituted with corresponding high temperature components listed in table III. All other features, except National Stock Numbers, shall remain as specified in the applicable specification sheets.

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TABLE III. Components substitution for high temperature fluorescent lighting fixtures.

Component	Fluorescent lighting fixtures using the 6 or 8 Watt fluorescent lamps		Fluorescent lighting fixtures using the 15 or 20 Watt fluorescent lamps	
	Use	In lieu of	Use	In lieu of
Lampholders	MIL-L-970/15	MIL-L-970/10	MIL-L-970/18	MIL-L-970/11
Starter sockets	MIL-L-970/19	MIL-L-970/13	MIL-L-970/19	MIL-L-970/13
Ballasts	M16377/45-002 of MIL-F-16377/45	M16377/45-001 of MIL-F-16377/45	M16377/44-002 of MIL-F-16377/44	M16377/44-001 of MIL-F-16377/44
Internal wiring	Wire with silicone impregnated fiber-glass insulation (SF-2, 150°C wire)	Wire with thermoplastic insulation	Wire with silicone impregnated fiber-glass insulation (SF-2, 150°C wire)	Wire with thermoplastic insulation
Wire connectors	Connectors with polyvinylidene fluoride (PVDF)	Connectors with nylon insulation	Connectors with polyvinylidene fluoride (PVDF)	Connectors with nylon insulation
Supply cable	Type DPS-3 or IPS-3 of MIL-C-915/40	Two or three conductor thermoplastic insulated cable	Type DPS-3 or IPS-3 of MIL-C-915/40	Two or three conductor thermoplastic insulated cable
Cable entrances	Aluminum washers and cap. Dimensions shall be as specified by applicable specification sheets of MIL-S-19622	Nylon washers and cap as specified by applicable specification sheets of MIL-S-19622	Aluminum washers and cap. Dimensions shall be as specified by applicable specification sheets of MIL-S-19622	Nylon washers and cap as specified by applicable specification sheets of MIL-S-19622

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3.12 400 Hertz (Hz) fluorescent lighting fixtures. When specified (see 6.2.1), the procedures specified hereinafter shall apply when 400 Hz in lieu of 60 Hz fluorescent lighting fixtures are required.

3.12.1 Symbol numbers. A "-400 Hz" for standard fixtures or a "HT-400 Hz" for high temperature fixtures shall be placed next to the symbol numbers specified in the applicable specification sheet to indicate a 400 Hz modification of the standard 60 Hz lighting fixtures. (Example: Symbol Number 77.4-400 Hz for standard fixtures or 77.4 HT-400 Hz for high temperature fixtures.)

3.12.2 Component substitution. 60 Hz ballasts specified in the applicable specification sheets shall be substituted with corresponding 400 Hz ballasts in accordance with MIL-F-16377/44 and MIL-F-16377/45. Other component substitution for high temperature fixtures shall be as listed in table III.

3.13 Workmanship. The fixtures, lights and parts, shall be manufactured and finished in a thoroughly workmanlike manner. Particular attention shall be paid to neatness and thoroughness of soldering, wiring, marking of parts and assemblies, plating, painting, machine screw assemblage, welding and freedom of parts from burrs and sharp edges.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Inspection system. The contractor shall provide and maintain an inspection system acceptable to the Government for supplies and services covered by this specification. The inspection system shall be in accordance with MIL-I-45208.

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

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

4.3 First article inspection. Unless otherwise specified (see 6.2.1 and 6.4), first article inspection shall be in accordance with the examination of 4.5 and the tests of 4.8 and as specified in the applicable specification sheet.

4.3.1 First article inspection report. The contractor shall prepare a first article inspection report in accordance with the data ordering documents included in the contract (see 6.2.2 and 6.9), and as specified in 4.3.2 through 4.3.4.

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4.3.1.1 Government inspection. When the contract specifies the first article inspection to be performed by the Government, the contractor shall submit the first article sample and a set of prints of the manufacturing drawings to the Laboratory specified (see 6.2.1 and 6.5) for the performance of the first article inspection.

4.3.1.2 Contractor inspection. When the contract specifies the first article inspection be performed by the contractor, the inspection shall be performed by the contractor and it shall be witnessed and the test results shall be verified by the Government inspector.

4.3.2 Order of tests. The order of tests may be at the option of the contractor except that for watertight and submersible enclosures, the following tests shall be performed in the order specified:

- (a) Effectiveness of enclosure.
- (b) Dielectric withstanding voltage.
- (c) Insulation resistance.
- (d) Vibration.
- (e) Shock.
- (f) Noise (when applicable).
- (g) Dielectric withstanding voltage.
- (h) Insulation resistance.
- (i) Effectiveness of enclosure.

For enclosures, other than watertight and submersible, the tests shall be in the same order, except that the effectiveness of enclosure, dielectric withstanding voltage, and insulation resistance test are not required prior to shock and vibration.

4.3.3 Inspection of parts. When shock, vibration and effectiveness of enclosure tests are specified in the applicable specification sheet for parts (window assemblies and glassware) that are an integral part of a fixture or light and are furnished as replacement parts, these parts shall be installed in a fixture or light, furnished by the Government, for the performance of these tests.

4.3.4 Combination of tests. Where advantageous, the contractor may combine test in cases where the basic body of the fixture or light to be tested is the same for different styles of the fixture or light. For example, in the case where a red globe is substituted for a diffusing globe to obtain red illumination in the incandescent fixtures or a clear white shielded window is substituted for a diffusing one in the fluorescent fixtures.

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the following:

- (a) Comparison inspection of 4.4.1.
- (b) Inspection of product for delivery of 4.4.2.

4.4.1 Comparison inspection. One sample from the first production run on each fixture, light or part shall be subjected to the same inspection specified in the applicable specification sheet for first article inspection when specified (see 6.2.1 and 6.10). Procedures for first article inspection specified in 4.3 shall also apply for comparison inspection.

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4.4.2 Inspection of product for delivery. Inspection of product for delivery shall consist of the following:

- (a) Examination of 4.5.
- (b) Quality conformance tests of 4.6.
- (c) Examination for preparation of delivery of 4.7.

4.4.2.1 Sampling plan for inspection of product for delivery. Sampling plan for inspection of product for delivery shall be as specified in 4.4.2.1.1 through 4.4.2.1.3.

4.4.2.1.1 Lot. For the purpose of sampling, a lot shall be the identical number of items on the contract or order.

4.4.2.1.2 Sampling for examination. Samples shall be selected at random from each lot in accordance with MIL-STD-105 at inspection level I for the examination of 4.5. The AQL shall be 2.5 percent defective. Samples containing one or more defects shall not be offered for delivery, and if the number of nonconforming items exceeds the acceptance number for that sample, the lot represented by the sample shall not be offered for delivery.

4.4.2.1.3 Sampling for quality conformance tests. Samples shall be selected at random from each lot in accordance with MIL-STD-105 at inspection level S-2 for the tests specified in 4.6. If any sample fails to conform to these tests, the sample and the lot represented thereby shall not be offered for delivery.

4.5 Examination. Fixtures, lights or parts shall be examined as specified in 4.5.1 and 4.5.2.

4.5.1 Visual examination. Fixtures, lights or parts shall be examined for the defects listed in table IV as applicable.

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TABLE IV. Visual defects.

Examine	Defect
Finish	Finish not as specified: blistered, peeled, chipped, or area of no film. Color not as specified.
Materials Construction and workmanship, general (applicable to all parts and assemblies)	Materials not as specified. Part missing, fractured, split, punctured, dented, deteriorated. Not in proper alignment. Sharp burr or edge, splinter or splinter.
Welding and brazing (where applicable)	Missing, incomplete, burn holes, cracked, fractured, or otherwise not fused, slag inclusion, slight undercut, not smooth and uniform, scale or flux deposits not removed.
Soldering (when applicable)	Missing, not adherent or incomplete. Not clean (flux or flux residue not removed); not smooth (surface not finished neatly), or pinholes in solder.
Bolts, nuts, screws, studs, pads, rivets and other types of fasteners Electrical assembly	Missing, broken, stripped, fractured, loose, bent, not peened or insufficiently peened. Connections at screw terminals and splice connections not as specified. Wiring not properly joined, loose at terminal, or not inclosed in specified conduit where required. Adequate slack not provided for wiring to relieve strain or excessive insulation stripped from wiring.
Gaskets (where applicable)	Not coated where required, missing, not as specified.
Marking for identification Instruction manual, tag or sheet (where applicable)	Missing, incomplete, not legible. Missing, incomplete, not legible.

4.5.2 Examination for weight and dimensions. Fixtures, lights or parts shall be examined to determine compliance with weight and dimensional requirements. Weights or dimensions not within specified tolerances shall be classified a defect.

4.6 Quality conformance tests. Fixtures, lights or parts shall be subjected to the tests specified in 4.6.1 through 4.6.3.

4.6.1 Complete fixtures or lights. Sample fixtures or lights shall be subjected to the operation test, the dielectric withstanding voltage test, and the insulation resistance test of 4.8.1, 4.8.2, and 4.8.3.

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4.6.2 Plastic windows for type I fixtures and lights. Sample plastic windows for type I fixtures and lights shall be subjected to the optical uniformity test and stress relief tests of 4.8.4 and 4.8.5. These tests shall be performed when the windows are furnished as an integral part of a fixture or light or as a repair part.

4.6.3 Lenses, globes and roundels for type II fixtures and lights. Lenses, globes and roundels for type II fixtures and lights shall be subjected to the optical uniformity test of 4.8.4. This test shall be performed when the lenses, globes and roundels are furnished as an integral part of a fixture or light or as repair parts.

4.7 Inspection of packaging. 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.

4.8 Test procedures.

4.8.1 Operation. The fixtures, lights, and parts shall be electrically and mechanically operated to determine conformance with the requirements of this specification.

4.8.2 Dielectric withstanding voltage. Fixtures, lights or parts shall be subjected for one minute to a dielectric test voltage, the effective potential of which is twice rated voltage plus 1,000 volts, applied between points of polarity and also between live parts and ground. The frequency of the test voltage shall be 60 Hz, root mean square, alternating current, and shall approximate a true sine wave. (A test potential of twice rated voltage plus 500 volts may be used for fixtures or lights rated 28 volts or less.)

4.8.3 Insulation resistance. After the dielectric withstanding voltage test (see 4.8.2) insulation resistance of the sample fixtures, lights or parts shall be measured between all current carrying parts and noncurrent carrying parts with a megohmmeter at a voltage not less than 500 volts direct current, at normal room temperature. This test is not required for unwired fixtures wherein plastic parts approved by NAVSEA, are certified by the manufacturer as meeting the requirements of 3.6.16.

4.8.4 Optical uniformity test for windows, lenses, globes and roundels. Windows, lenses, globes and roundels furnished either as a part of a fixture or light or as replacement parts shall be examined to ascertain that the product is of uniform quality as to color, clarity and freedom from dead zones or streaks. Unless otherwise specified, (see 6.2.1) the source of light shall be a standard 100 watt, 120 volt, tungsten filament lamp operating at approximately normal rated voltage. This test may be combined with the operation test of 4.8.1 where the source of light shall be that of the fixture or light.

4.8.5 Stress relief test for plastic window for type I fixtures and lights. The windows shall be placed between a pair of polarizing lenses and a light source to determine conformance with 3.8.5.3.

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4.8.6 Light output. Test procedure for measuring light output shall conform to the appropriate Illuminating Engineering Society (IES) guides for photometric and colorimetric testing and the applicable specification sheet.

4.8.6.1 Candlepower distribution. When specified on the applicable specification sheet, a candlepower distribution curve shall be obtained from the sample fixture or light. Before any measurements are taken, the fixture or light shall be operated until the light output has reached a stable condition.

4.8.6.2 Footcandle distribution. When specified on the applicable specification sheet, a footcandle curve shall be obtained from the sample fixture or light. Before any measurements are taken, the fixture or light shall be operated until the light output has reached a stable condition.

4.8.6.3 Color and luminous transmittance. When specified on the applicable specification sheet, the color and luminous transmittance of windows, globes, roundels, lenses, and filters shall be checked to determine conformance with 3.7.3.

4.8.7 Shock test. The sample fixture, light or part shall be subjected to the type A, H.I. shock test in accordance with MIL-S-901 for grade A or B (see 3.5.12), class I for fixtures and lights without shockmounts or class II for fixtures and lights with shockmounts, light weight equipment. Fixtures or lights shall be energized during this test. The first article inspection report (see 4.3.1) shall include photographs of the test set-up and any failed element.

4.8.7.1 Mounting. Mounting of fixtures, lights and parts on the shock machine shall simulate normal shipboard installation. Mounting dimensions and hardware shall be as specified on the applicable specification sheet. Fixtures, lights and parts shall be securely mounted on the shock machine in accordance with the standard methods shown on figure 17.

4.8.8 Vibration test. The sample fixture, light, or part shall be subjected to a vibration test conforming to type I vibration of MIL-STD-167-1. Mounting for fixtures and lights shall simulate shipboard installation. Fixtures or lights shall be energized during this test. The first article inspection report (see 4.3.1) shall include copies of the vibration test reports and photographs as outlined in MIL-STD-167-1.

4.8.9 Noise test. When required (see 3.5.14), after the vibration and shock tests are conducted, the sample fixture, light or part shall be submitted to an airborne noise test as follows: Using a sound level meter (Gen Rad Inc., type 1551-C sound level meter or equal) determine the ambient noise level 12 inches from the fixture, light or part under test. The maximum acceptable ambient noise level is 40 dB. With the fixture, light or part energized, determine the maximum combined (ambient plus test piece) noise level at a distance of 12 inches from the test piece in all directions. The combined noise shall fall within the shaded area of figure 20. The fixture, light, or part shall be mounted as in actual service during this test. MIL-STD-740 may be used as a guide. Calibration testing and reporting of data shall be in accordance with MIL-STD-740.

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4.8.10 Salt spray test. The sample fixture, light or part shall be subjected to a salt spray test in accordance with method 101 of MIL-STD-202, test condition A. The salt solution concentration shall be 20 percent.

4.8.11 Grounding circuit. The grounding circuit of the fixture, light or part shall be tested by placing a current of not more than 5 nor less than 4 amperes through the grounding circuit for a period of not less than 1 minute. This shall be done with the fixture, light or part insulated from the ground conductor. The ground conductor of a 2-foot cable shall be connected to one end of the circuit, and the exposed metal portion of the fixture, light or part shall be connected by means of a test clip to the other end of the circuit. This circuit shall be placed in series with an ammeter and some means of limiting the current to the specified value. The potential drop through the ground connection when carrying between 4 and 5 amperes shall be measured by means of a voltmeter having a full scale deflection of not more than 3 volts connected between a metal portion of the fixture, light or part in electrical contact with the grounding circuit and the ground conductor of the cable. This potential shall not exceed 0.25 volt, and no arcing or burning in the grounding circuit shall be evident. The resistance of the grounding circuit shall be measured with a milliohmmeter, and the resistance of the circuit shall not exceed 0.1 ohm.

4.8.12 Continuity of grounding. The resistance shall be measured with a milliohmmeter between protruding tip of shockmount and any remote internal metallic structure of the housing assembly of fixture, light or part.

4.8.13 Leakage current (portable fixtures only). Leakage current test shall be conducted with the fixture, light or part operating at approximately the normal operating temperature. The metal portion of the fixture, light or part shall be ungrounded. Prior to the leakage current test, the resistance from the grounding conductor of the extension cable to the exposed metal portion of the light shall be measured, and found to be less than 0.1 ohm. For measurement of leakage current, all connections shall be made at the end of a 2-foot long cable. An adapter may be used to facilitate making connections to the power source and meter. To operate the fixture, light or part, the power source shall be connected to the proper conductors of the cable; however, the grounding conductor shall be left unconnected except as required for this test. For leakage current measurements, each line shall be connected successively to the grounding contact of the cable and the current flowing in the connecting wire measured.

4.8.14 Enclosure effectiveness. Effectiveness of the enclosures of the sample fixture, light, or part shall be determined as specified hereinafter.

4.8.14.1 Totally enclosed. No special tests are required. It shall be ascertained by examination that the enclosure effectively performs its function and that the openings are not larger than those permitted by MIL-STD-108.

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4.8.14.2 Dripproof. Dripproof enclosures shall be tested in accordance with MIL-STD-108. The fixture, light, or part shall be mounted in normal position when tested. There shall be no leakage except as permitted by MIL-STD-108.

4.8.14.3 Splashproof. Splashproof enclosures shall be tested in accordance with MIL-STD-108. The fixture, light, or part shall be mounted in normal position when tested. There shall be no entry of water into the enclosure when the fixture, light, or part is subjected to a stream of water as specified in MIL-STD-108.

4.8.14.4 Watertight and submersible. Upon completion of the tests specified in 4.8.7 and 4.8.8 watertight and submersible enclosures shall be tested in accordance with MIL-STD-108. Before conducting this test, all joints that have gaskets, or sealing compound, or that have been painted, and which are subjected to being opened and closed, shall be opened and closed three times (this includes doors and covers but does not include indicator and observation windows). There shall be no leakage of water into the enclosure after it has been subjected to the test conditions of MIL-STD-108.

4.8.14.5 Explosionproof. Explosionproof enclosures shall be tested as specified in 4.8.15.

4.8.14.6 Combined explosionproof-watertight. Combined explosion-proof-watertight enclosures shall be tested as specified in 4.8.14.4 and 4.8.15.

4.8.15 Explosionproof tests. After all tests have been conducted, sample fixtures and lights, having explosionproof or combined explosion-proof-watertight enclosures shall be forwarded to the Department of Labor, Mine Safety and Health Administration (MSHA), Approval and Certification Center, P.O. Box 201B, Industrial Park Rd., Triadelphia, WV, 26059, for explosionproof tests. A copy of the applicable master drawing shall accompany the fixture, or light.

4.8.15.1 Test procedures. Test procedures shall be as follows:

- (a) The fixture or light shall be drilled and tapped to permit making pipe and valve connections for circulation of vapors through it, and for inserting a spark plug and pressure indicator. Electrical connections for operating the fixture or light in some of the tests shall also be made where necessary. If the fixture or light is required to be watertight, the explosionproof tests shall be conducted with the watertight gaskets in place.
- (b) When the fixture or light is ready for testing, measured amounts of highly volatile petroleum ether, or suitable equivalent, shall be evaporated on a hot plate. After circulating the vapor through the enclosure and test chamber long enough to insure a uniform mixture, the valve shall be closed to isolate the interior from the surrounding atmosphere. Then the mixture in the enclosure shall be ignited by means of the spark plug. The percentage

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of petroleum ether in the atmosphere shall be varied throughout the explosive range by using different amounts of petroleum ether. The discharge of flame from any point in the enclosure, even though no ignition of the surrounding atmosphere takes place, shall be recorded as a failure of the fixture or light. Twenty such tests shall be conducted and shall be sufficient to prove the safety of the fixture or light unless some weakness such as deformation of the enclosure develops that in the judgment of the testing personnel needs further investigation. Deformation of flat surfaces shall be checked by means of a straight edge.

Any of the following shall be cause for rejection of the fixture or light.

- (a) Discharge of flame from any joint or opening.
- (b) Ignition of surrounding explosive mixtures.
- (c) Development of dangerous after-burning (that is, the burning immediately after an internal explosion, of a gaseous mixture that is not in the enclosure at the time of the explosion but was drawn in as the result of the cooling of the products of the original explosion).
- (d) Rupture or permanent distortion of the fixture or light.

4.8.16 Electromagnetic interference (type I only). Type I fixtures, lights or parts, shall be subjected to an electromagnetic interference test in accordance with MIL-STD-462.

4.8.17 Tests for glassware. Tests for glassware shall be conducted as specified hereinafter.

4.8.17.1 Color determination test. One sample of each colored glassware shall be broken to determine conformance with 3.7.5.4.

4.8.17.2 Paint removal test. Sample glassware shall be submerged in any commercially available paint and varnish remover for a period of not less than 3 minutes to determine conformance with 3.7.5.5.

4.8.17.3 Mechanical shock test. Sample glassware shall rest with its flat surface on a soft 2-foot by 2-foot by 2-inch thick wood plank as shown on figure 18. A 3-pound polished steel ball shall be allowed to fall free and strike the glassware on the center of the outside surface. Striking force shall be as specified on the applicable specification sheet.

4.8.17.4 Thermal shock test. Sample glassware shall be uniformly heated to a temperature of $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 1 hour. The samples shall then be immediately immersed completely in water at a temperature of 0° to 10°C . At least ten consecutive cycles shall be performed on each sample.

4.8.17.5 External hydrostatic pressure test. Sample glassware shall be installed on lights for which they are designed and shall then be submerged in water in a pressure tank. An external hydrostatic pressure as specified in the applicable specification sheet shall be applied for a period of 1 hour.

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4.8.17.6 Breakage pattern test. Sample glassware shall rest with its flat surface on a soft 2-foot by 2-foot by 2-inch thick wood plank as shown on figure 18. A steel ball shall be allowed to fall free and strike the glassware on the center of the outside surface with a force great enough to break the glassware.

4.8.18 Magnetic permeability. The magnetic permeability of the material shall be determined with an indicator in accordance with MIL-I-17214.

4.8.19 Ambient temperature. The lights shall be operated for 100 hours at the ambient temperature and voltage specified in the applicable specification sheet. The light shall be fully assembled (with all gaskets, if applicable, in place).

5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisitions. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.5.)

5.1 Preservation-packaging, packing, and marking. Fixtures, lights (lighting) and associated parts shall be individually packaged level A or C, packed level A, B, or C as specified (see 6.2.1) and marked in accordance with MIL-E-17555. Unless otherwise specified (see 6.2.1), packaging technical data or the rough handling tests specified in MIL-E-17555 are not required.

5.1.1 Talc/talcum. Talc/talcum used in the packaging process of item(s) shall be free of asbestos.

6. NOTES

6.1 Intended use.

6.1.1 Class I fixtures and lights are intended for use in detail lighting on board ship. Examples of such applications among others are mirror and berth illumination, desk lighting, gageboard and spot illumination.

6.1.2 Class 2 fixtures and lights are intended for use in general illumination on board ship. Fixtures and lights for general white illumination are also used for red or blue illumination by the use of proper filters inserted either in the lighting fixtures or over the fluorescent lamps.

6.1.3 Overhead standard mounted fixtures and lights are intended to be mounted on the overhead by standard shockmounts.

6.1.4 Overhead flush mounted fixtures and lights are intended to be flush mounted in areas where sheathing is employed in the overhead.

6.1.5 Explosionproof fixtures and lights are intended for use in areas where explosive atmospheres exist. Examples of such applications, are gasoline, jet fuel, paint and ammunition storage areas.

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6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type, class, and symbol required (see 1.2 and 3.1).
- (c) Title, number, and date of the applicable specification sheet (see 3.1).
- (d) That prior to submission of the sample for first article inspection, the Government inspector shall verify that the sample was manufactured with production tools and processes (see 3.2).
- (e) Whether one hundred percent nonmagnetic material is required (see 3.4.8).
- (f) If lamps are required for incandescent fixtures (see 3.6.2).
- (g) Type of starter required if other than specified on the applicable specification sheet (see 3.6.6).
- (h) Whether switches are required (see 3.6.10).
- (i) If electromagnetic interference requirements are required (see 3.6.14).
- (j) Whether red filter tubes for fluorescent lamps are required (see 3.7.7.1).
- (k) If first article inspection is required (see 4.3).
- (l) If high temperature fluorescent lighting fixtures are required (see 3.12).
- (m) If 400 Hz standard or 400 Hz high temperature fluorescent lighting fixtures are required (see 3.12).
- (n) Type of inspection required and designation of laboratory (see 4.3 and 6.4).
- (o) If the source of light shall be standard (see 4.8.4).
- (p) Preservation and packaging, packing, and marking requirements if other than required by 5.2 (see 5.3).

6.2.2 Data requirements. When this specification is used in a contract which incorporates a DD Form 1423 and invokes the provisions of 7-104.9(n) of the Defense Acquisition Regulation (DAR), the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DAR-7-104.9(n) are not invoked, the data specified below will be delivered by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

<u>Paragraph</u>	<u>Data requirements</u>	<u>Applicable DID</u>	<u>Option</u>
3.3	Drawings, engineering and associated lists	DI-E-7031	Level 3
3.3	Certification data report	UDI-A-23264	----
4.3.1	First article inspection report	DI-T-4902	----

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(Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.)

6.2.2.1 The data requirements of 6.2.2 and any task in section 3, 4, or 5 of the 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).

6.3 Provisioning. Provisioning Technical Documentation (PTD), spare parts, and repair parts should be furnished as specified in the contract.

6.3.1 When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in the manufacture of the equipment. Packaging for such parts should also be specified.

6.4 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.

6.4.1 The contractor, prior to award of a contract or order, may perform the first article inspection at a Government laboratory (see 6.5) at his own expense and risk. This action, however, neither constitutes an obligation by the Government to purchase nor authorizes the expenditure of Government funds.

6.4.2 Contractors and manufacturers should contact NAVSEA before conducting tests to discuss technical details of testing.

6.4.3 Unless otherwise directed by NAVSEA, substitution of comparison inspection in lieu of first article inspection is acceptable and desirable for those companies offering products which have been previously acquired or tested by the Government.

6.5 Government inspection. Unless otherwise directed by NAVSEA, Government inspection should be performed at the Portsmouth Naval Shipyard, Equipment Testing Laboratory, Portsmouth, NH 03801.

6.6 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.

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6.7 NAVSEA. The word "NAVSEA" as used herein refers to the Naval Sea Systems Command, Electrical Equipment Division, Department of the Navy, Washington, DC 20362.

6.8 Symbol number. Symbol number is a standard equipment designation. Symbol numbers are listed in publication NAVSEA S0300-AT-GTP-010/ESL.

6.9 Approval of the first article inspection report. Unless otherwise directed by NAVSEA the Purchasing Contracting Officer (Naval Shipyards, Private Shipyards/Supervisor of Shipbuilding Conversion and Repair and Defense Supply Agencies) will, by written notice to the contractor, waive, approve, conditionally approve, or disapprove the first article inspection report. When it is deemed necessary, the Purchasing Contracting Officer will forward the first article inspection report to NAVSEA for resolution on acceptance or nonacceptance of marginal or nonconforming supplies.

6.10 Comparison inspection. Comparison inspection is not mandatory but it is highly desired to assure that production runs conform to the tests results of the first article inspection. Comparison inspection should be mandatory for these companies manufacturing the fixtures, lights or parts under this specification for the first time.

6.11 Electromagnetic interference. Fluorescent lighting fixtures (type I) manufactured in accordance with this specification meet the radiated electromagnetic interference requirements of MIL-STD-461 for class IIB equipment when tested in accordance with MIL-STD-462. When more stringent requirements are required, these requirements should be as specified in the contract or order and the fixtures shall be modified and tested accordingly. Suggested modification methods may be obtained from NAVSEA.

6.12 Changes from previous issue. Asterisks (*) are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Preparing activity:
Navy - SH
(Project 6210-N533)

MIL-F-16377G(SH)

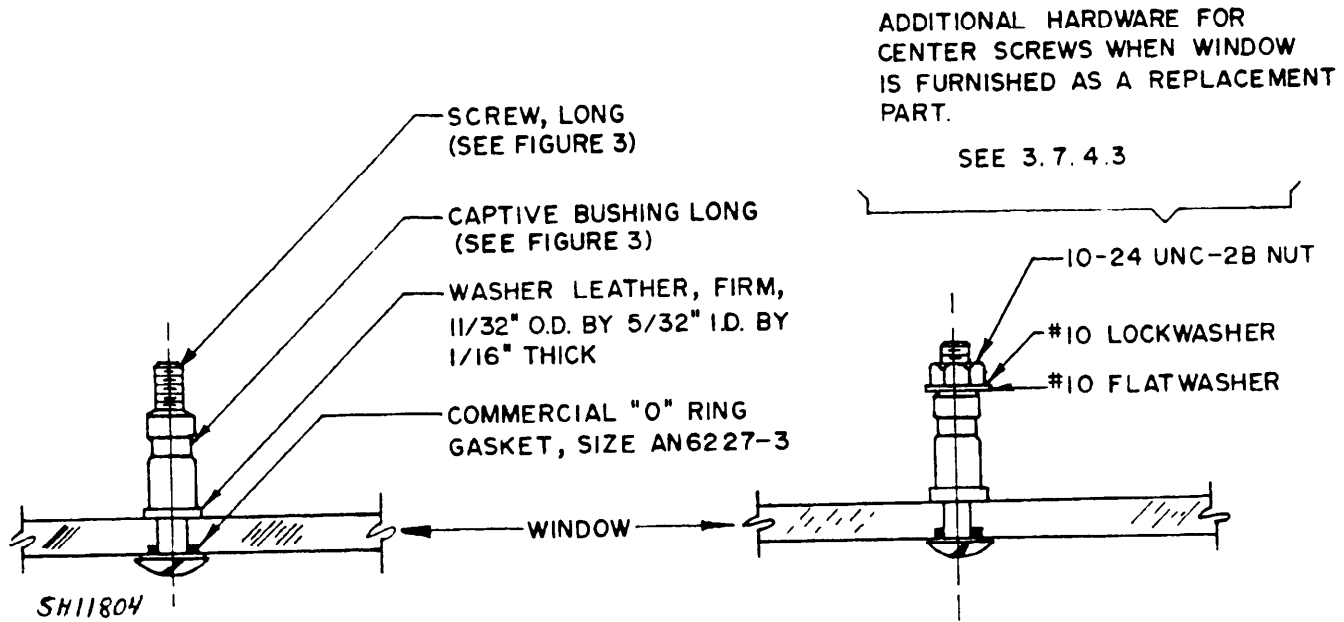


FIGURE 1. Securing screw assembly (long) for watertight window assemblies.

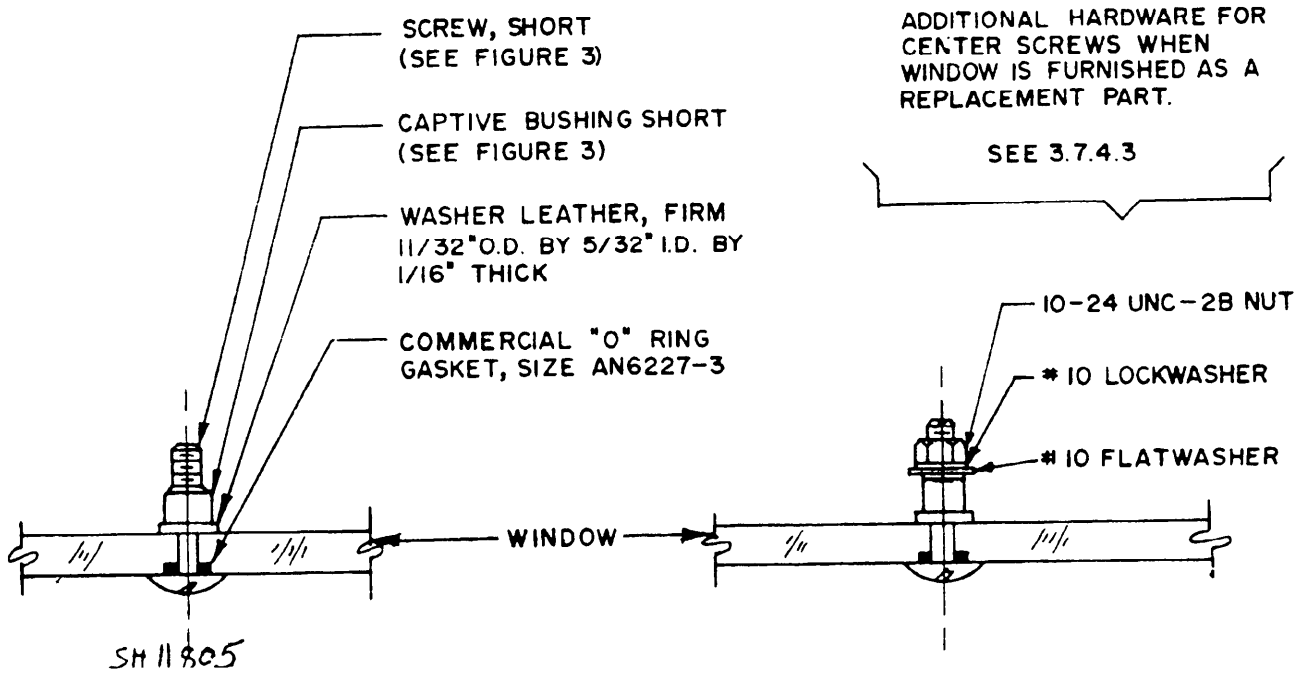


FIGURE 2. Securing screw assembly (short) for watertight window assemblies.

MIL-F-16377G(SH)

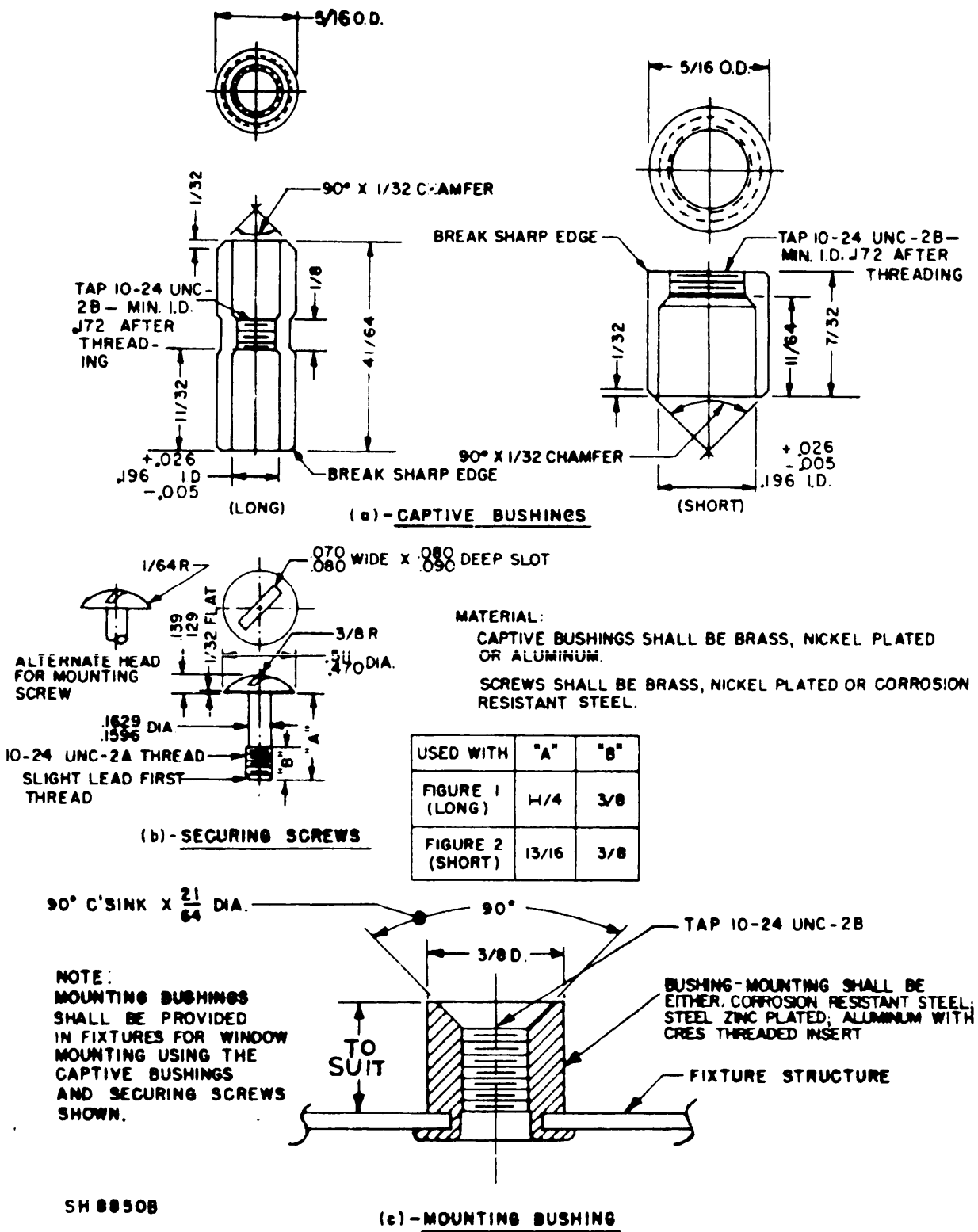


FIGURE 3. Captive bushings, securing screws and mounting bushings.

MIL-F-16377G(SH)

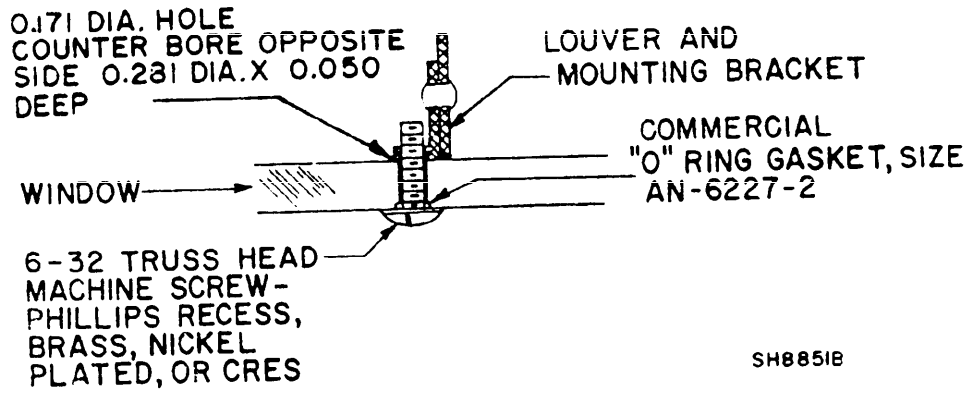


FIGURE 4. Louver attachment for watertight window assemblies.

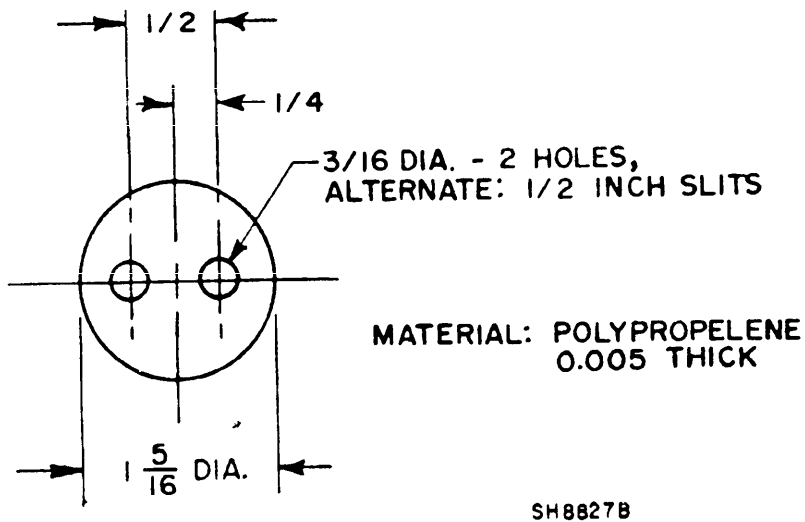


FIGURE 5. Starter washer.

MIL-F-16377G(SH)

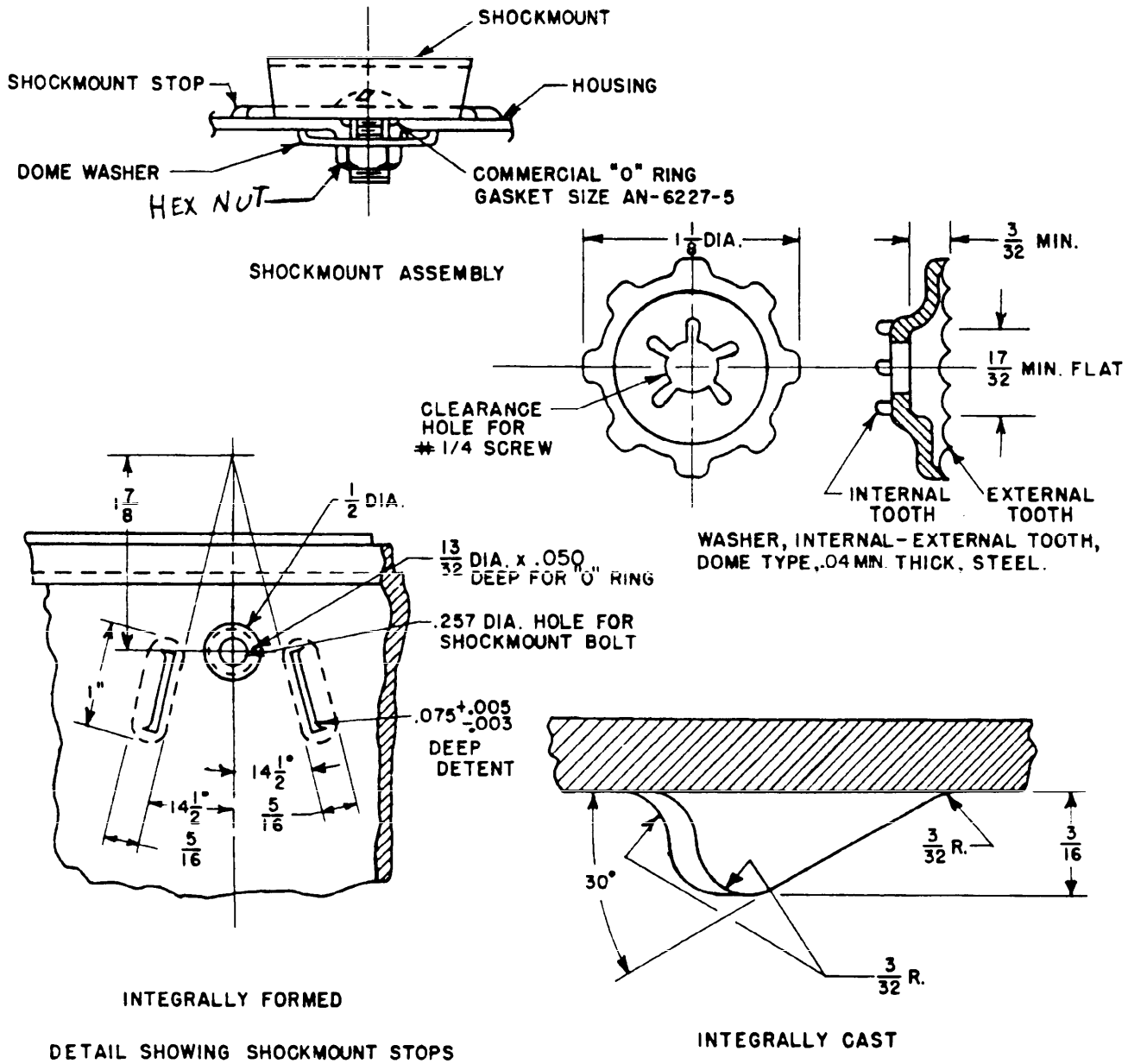
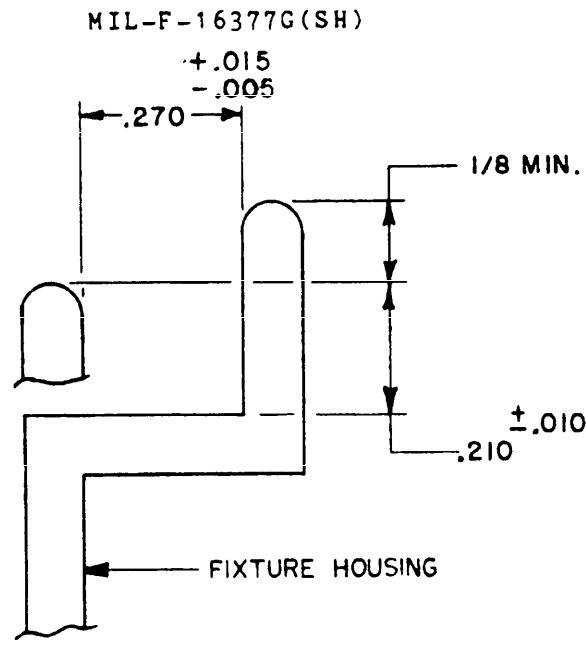
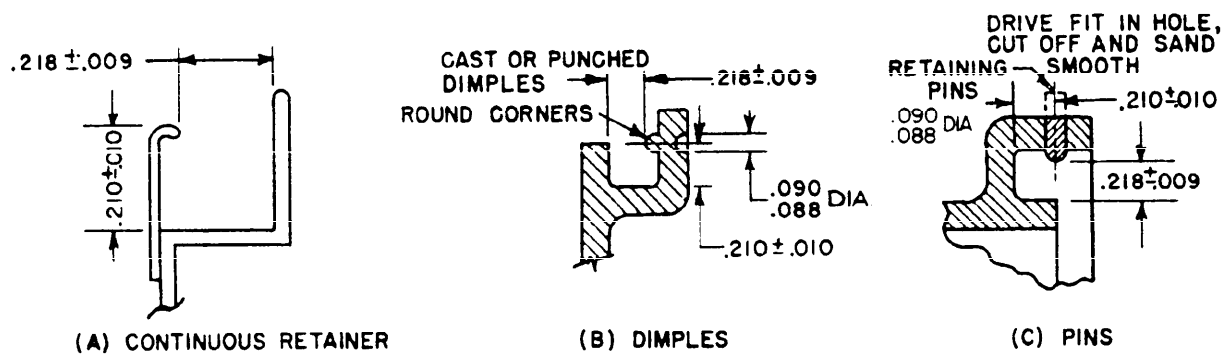


FIGURE 6. Shockmount installation for type I, class 2 fixture.



DIMENSIONS FOR GASKET GROOVE



NOTES:

1. CONTINUOUS GASKET RETAINER SHALL SPAN AT LEAST THE LENGTH SHOWN ON APPLICABLE SPECIFICATION SHEET BY THE TWO (2) EXTREME NOTCHES ON EACH SIDE OF THE WINDOW ASSEMBLIES.
2. LOCATION OF GASKET RETAINING DIMPLES OR PINS ON FIXTURE HOUSINGS SHALL CORRESPOND TO THE LOCATION OF THE NOTCHES SHOWN ON APPLICABLE SPECIFICATION SHEET FOR THE WINDOW ASSEMBLIES.

METHODS OF RETAINING "O" RING GASKET

SM1004A

FIGURE 7. Dimensions for gasket groove and methods for retaining "O" ring gasket for type I, class 2 fixtures.

MIL-F-16377G(SH)

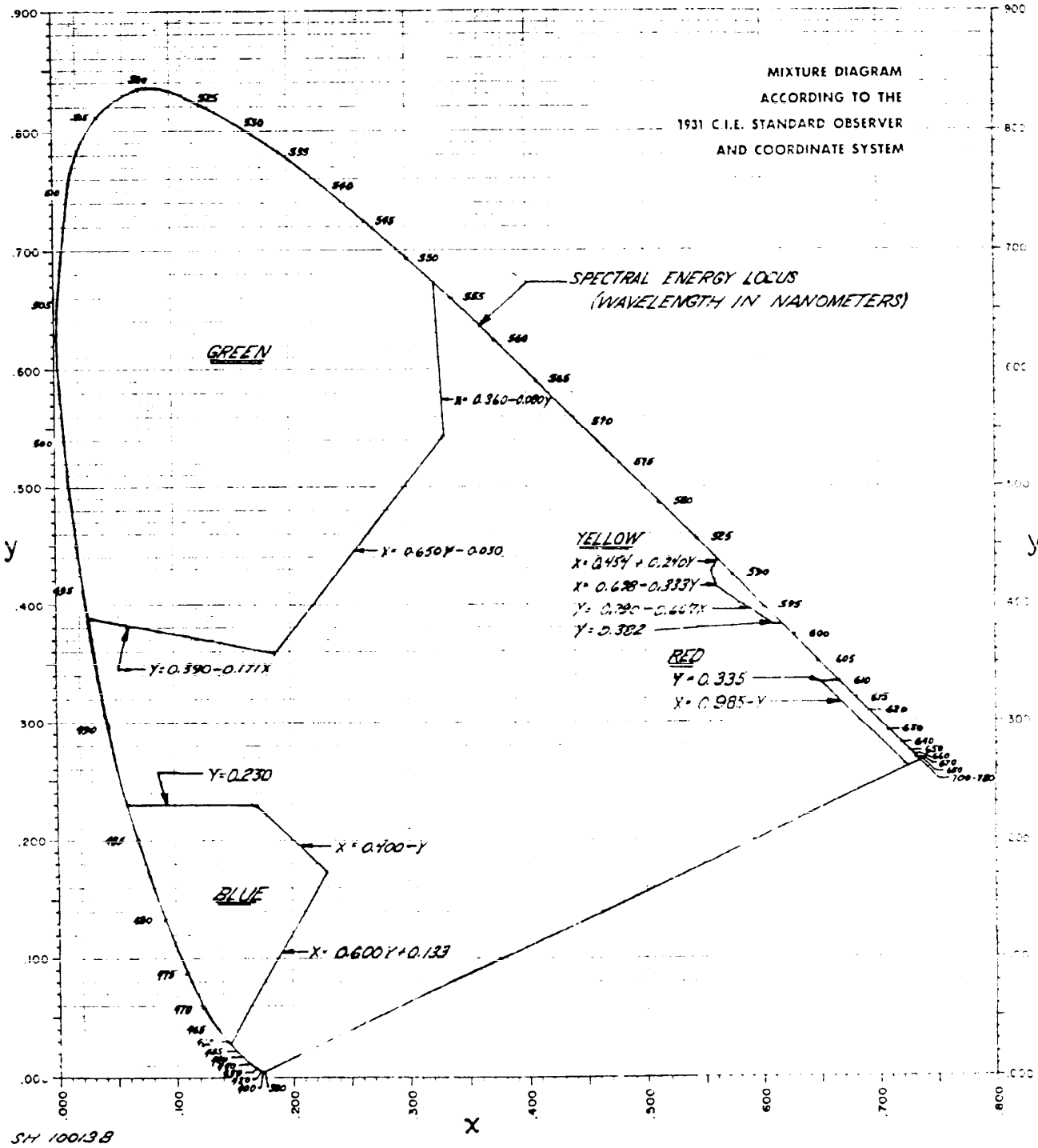
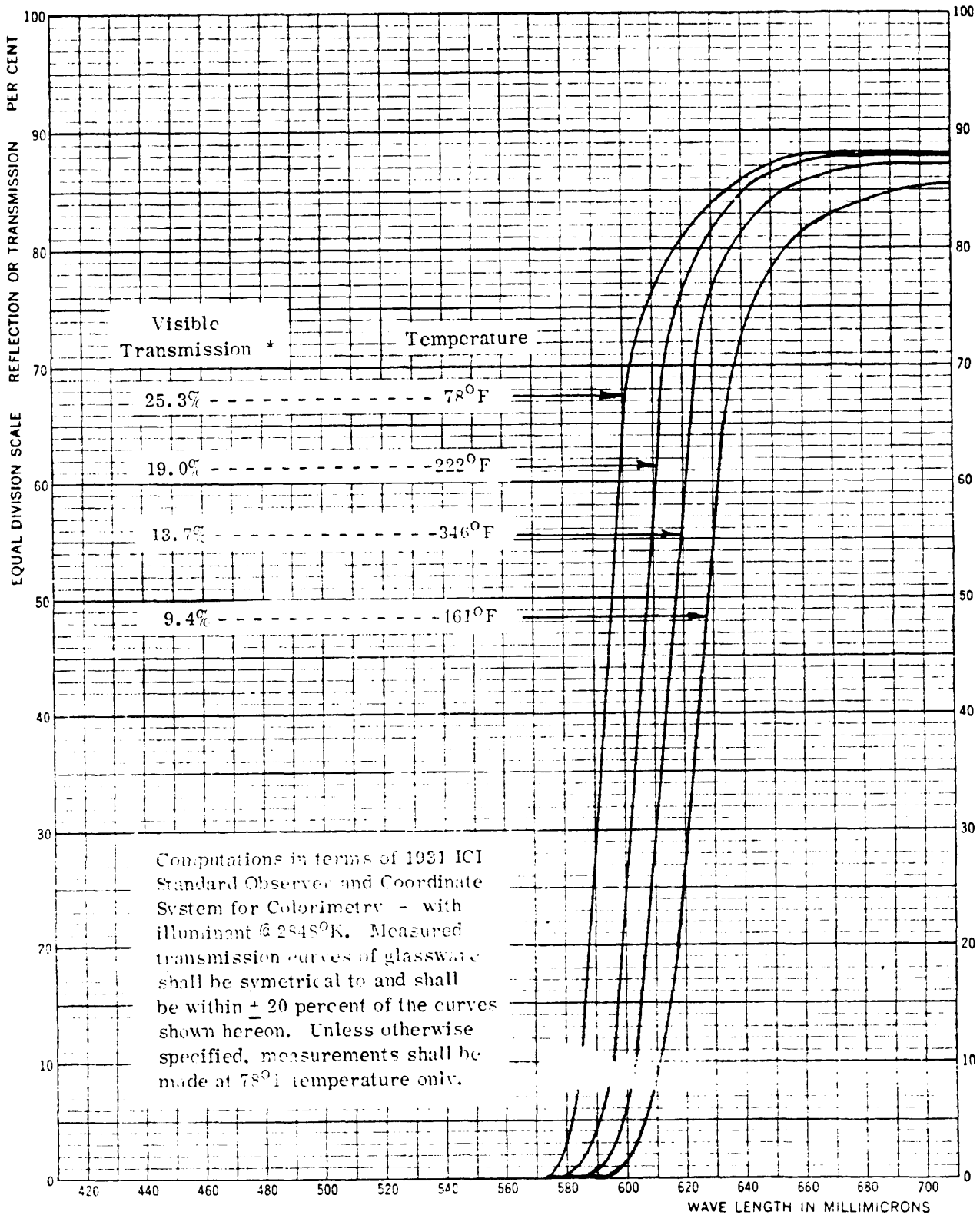
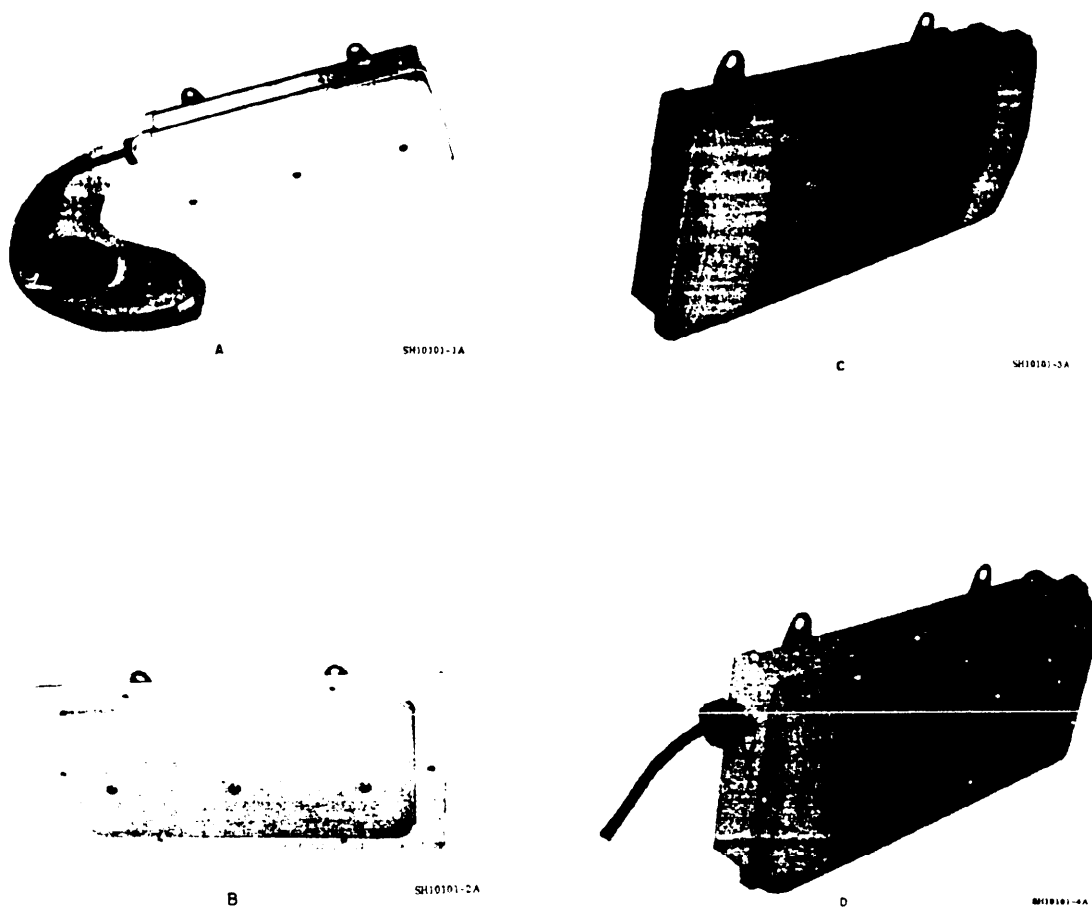


FIGURE 8. Chromaticity diagram illuminant A.

MIL-F-16377G(SH)

FIGURE 9. Light transmission curves of red glassware.

MIL-F-16377G(SH)



- A - Standard mounting - white diffusing window assembly.
- B - Flush mounting - white diffusing window assembly.
- C - Standard mounting - clear and white prismatic.
- D - Standard mounting - clear and white prismatic directional.

NOTE:

1. Clear white shielded windows are also available with flush mounting fixture, style "B".
2. Details for different styles and sizes are shown on MIL-F-16377/5 to MIL-F-16377/12, MIL-F-16377/14, MIL-F-16377/65 and MIL-F-16377/66.

FIGURE 10. Typical styles of fluorescent lighting fixtures for general overhead lighting.

MIL-F-16377G(SH)

MIL - F - 16377/21 A
 SYM. NO. 90.2
 NSN 6210-00-548-0081
 JOHN DOE CO. TROY N. Y.

EXAMPLE
 FOR EQUIPMENT IDENTIFICATION

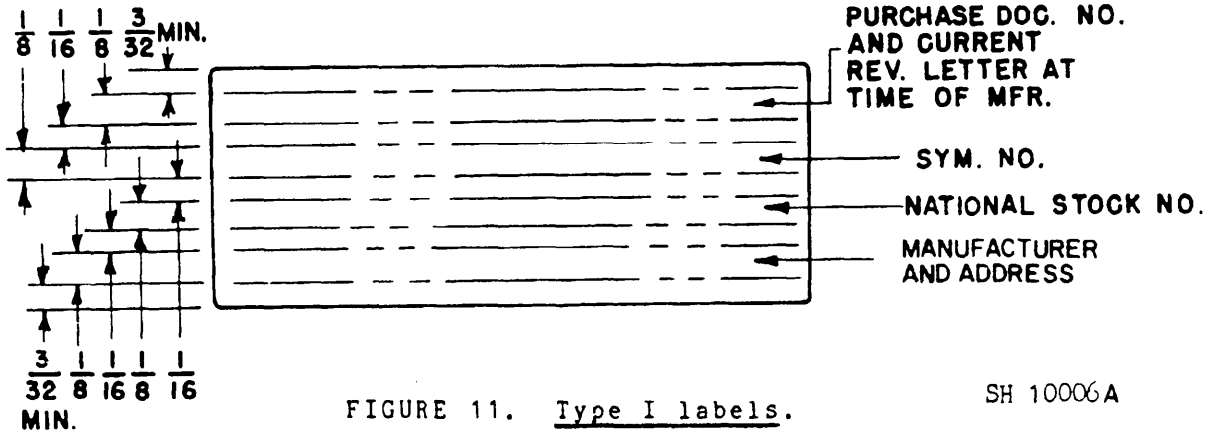


FIGURE 11. Type I labels.

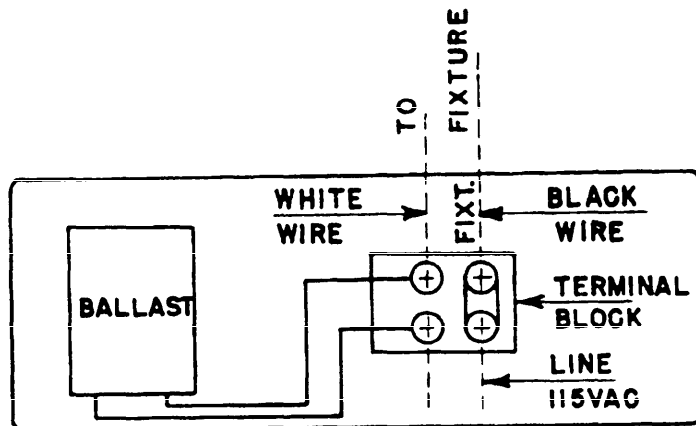
SH 10006A

FOR SINGLE WHITE OR RED CIRCUIT: CONNECT WHITE LEAD TO WHITE LINE TERMINAL. CONNECT RED AND BLACK LEADS TO OTHER LINE TERMINAL.
 FOR COMBINATION RED AND WHITE CIRCUITS: CONNECT WHITE LEAD TO WHITE LINE TERMINAL. CONNECT BLACK LEAD TO BLACK LINE TERMINAL. CONNECT RED LEAD TO RED LINE TERMINAL.

SH 10007

FIGURE 12. Type II labels.

MIL-F-16377G(SH)



TYPICAL WIRING DIAGRAM LABEL

SH 10008 A

FIGURE 13. Type III labels.

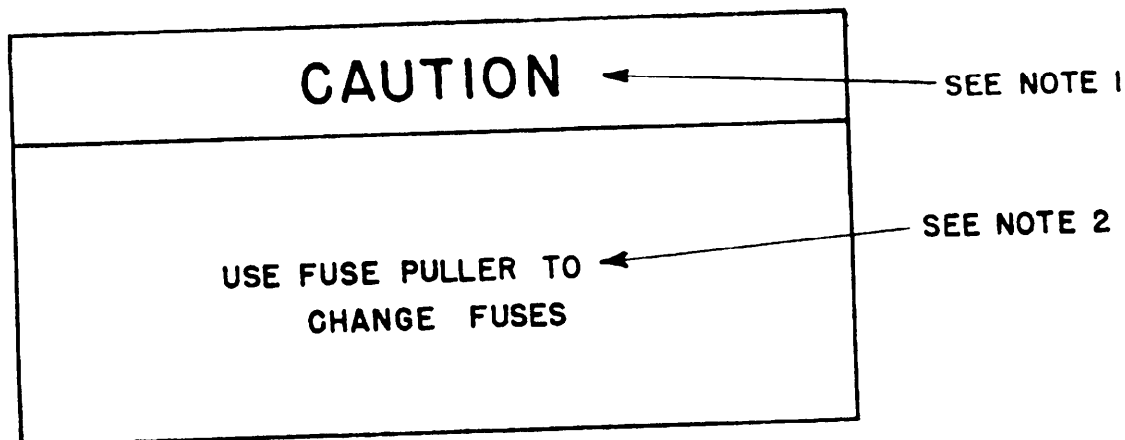
INSTALL THE FOLLOWING LAMP ONLY
NSN6240-00-246-5054

SH 10009 A

TYPICAL INFORMATION LABEL

FIGURE 14. Type IV labels.

MIL-F-16377G(SH)



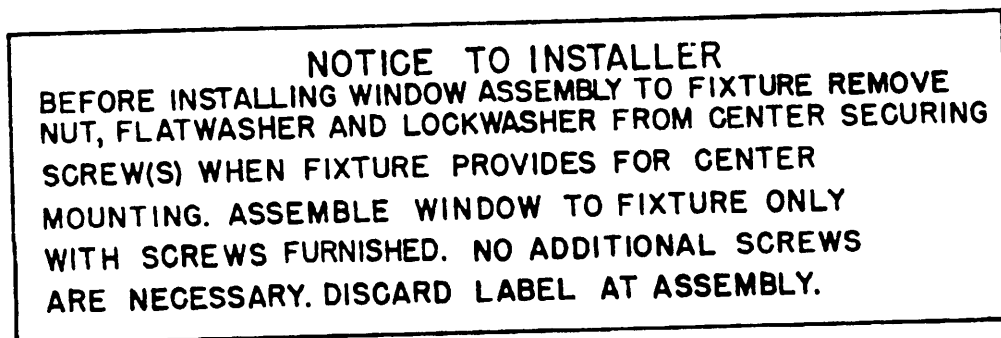
NOTES:

1. YELLOW WORDING ON BLACK.
2. BLACK WORDING ON YELLOW.
3. MINIMUM HEIGHT OF LETTERS SHALL BE 3/32 INCH.

TYPICAL WARNING LABEL

SH 10010

FIGURE 15. Type V labels.

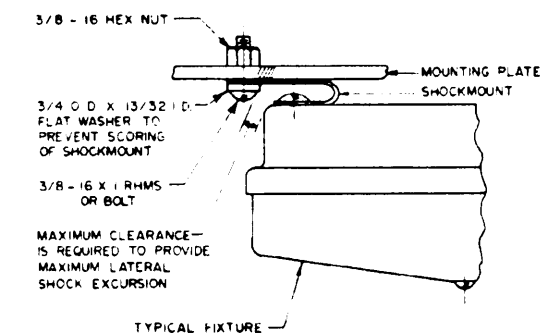


**TYPICAL INFORMATION LABEL FOR WINDOWS THAT ARE
FURNISHED AS REPAIR PARTS.**

SH 10011

FIGURE 16. Type VI label.

MIL-F-16377G(SH)



SH10350-1A (A) MOUNTING OF LIGHTS THAT ARE FURNISHED WITH SHOCKMOUNTS

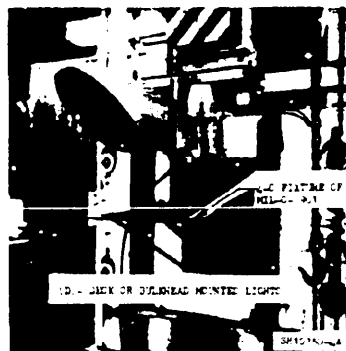
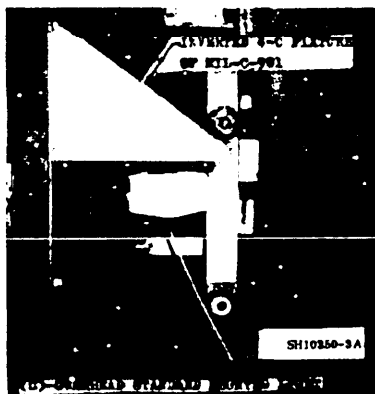
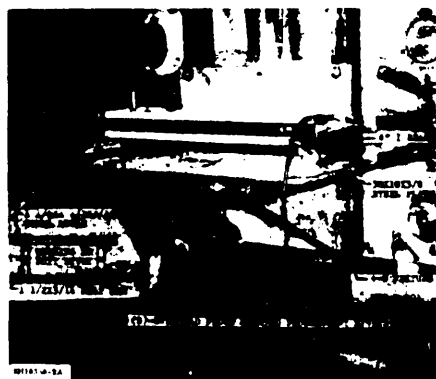


FIGURE 17. Standard methods of mounting lights for shock tests.

MIL-F-16377G(SH)

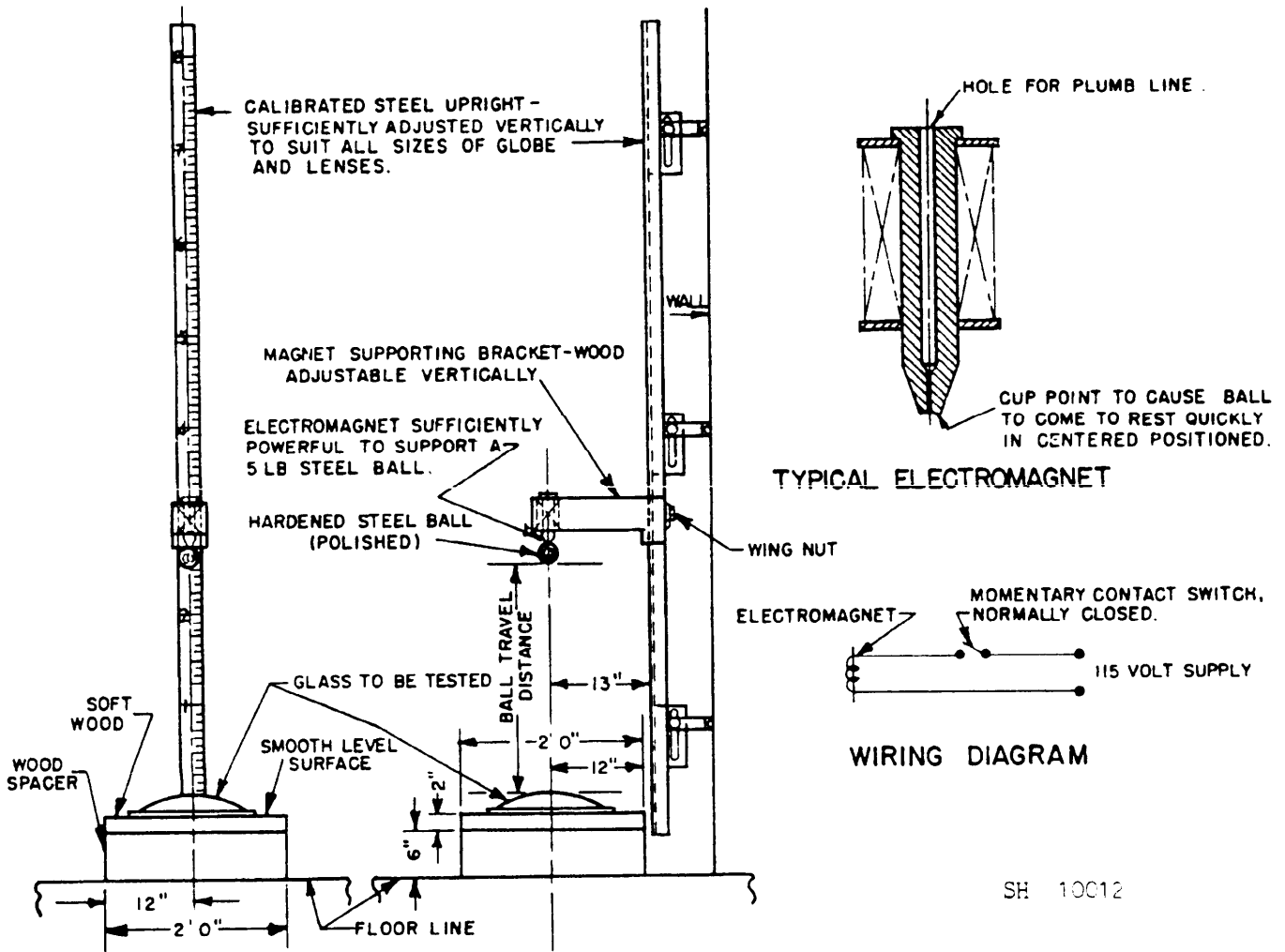
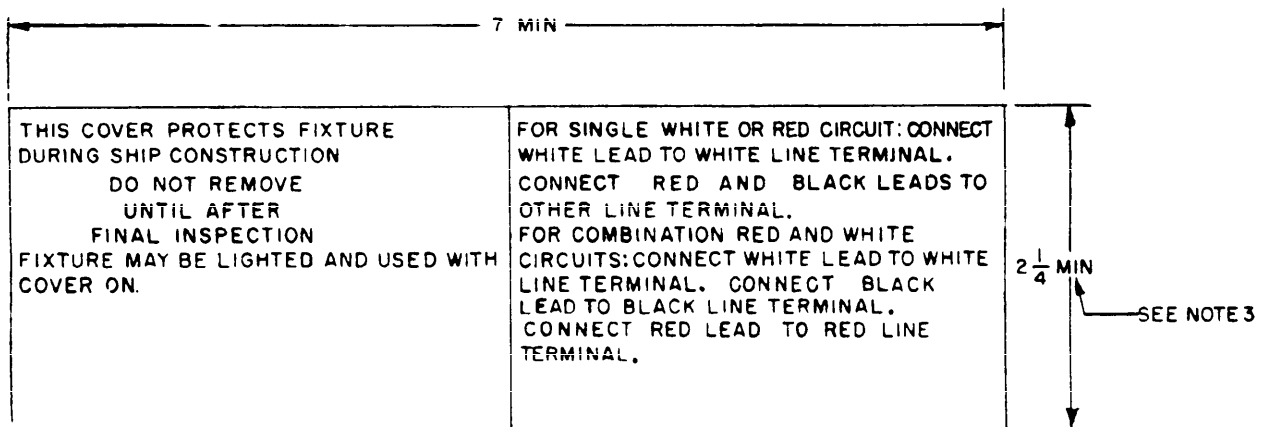
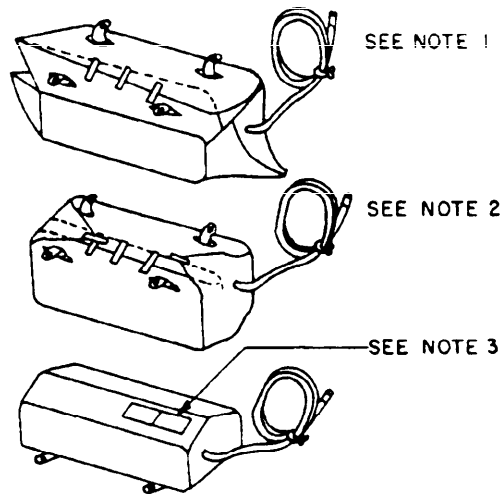


FIGURE 18. Typical ball impact equipment for shock test of glass-ware.

MIL-F-16377G(SH)



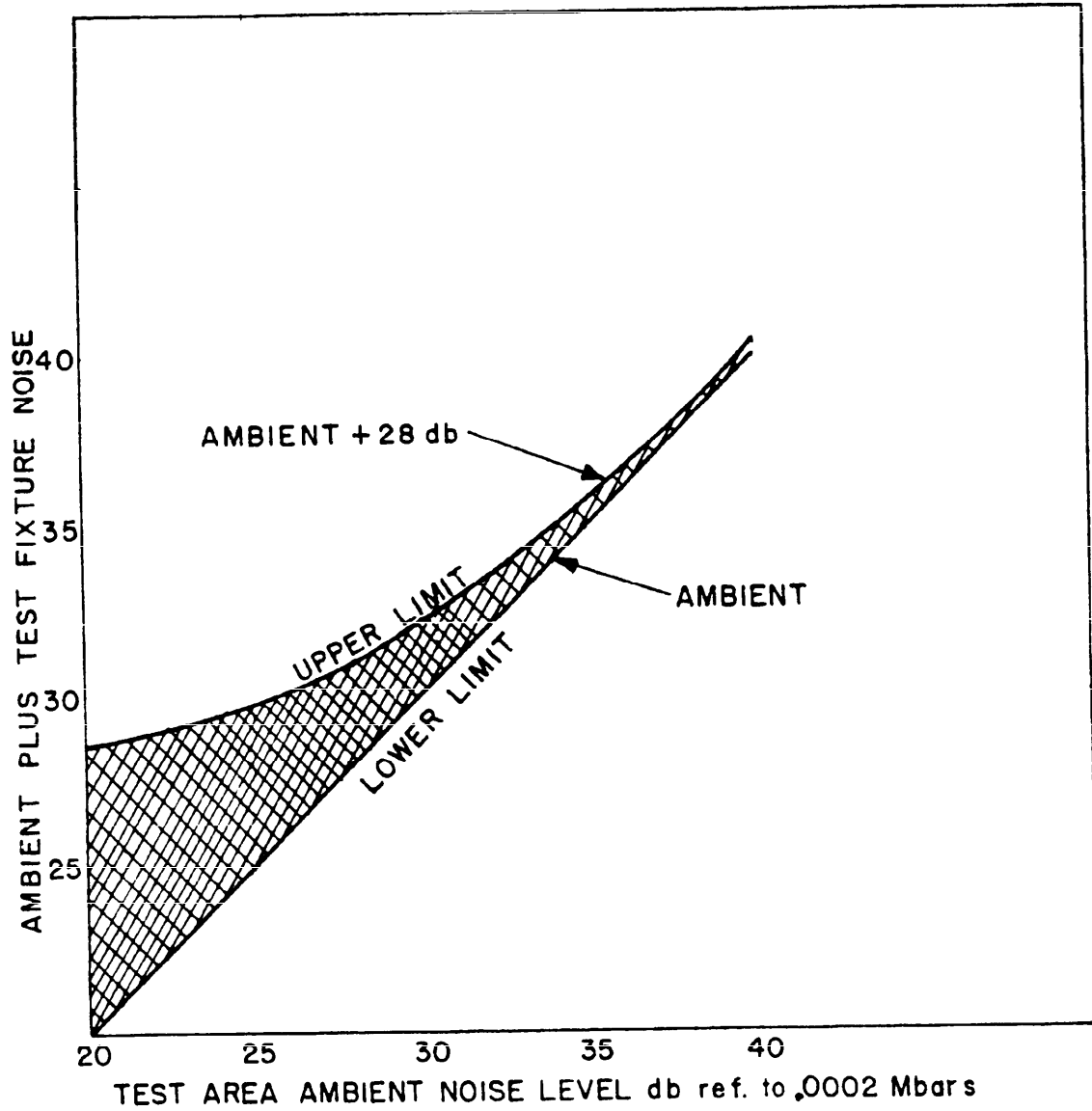
SH8054A

NOTES:

1. Insert fixture in cover. Secure with adhesive tape or weld.
2. Fold ends over top of fixture and secure with adhesive tape or weld.
3. The legend shown on the above diagram shall be stamped on the lower edge of the closed side of the cover. Size and style of type used shall produce a legible copy when applied to the cover. Legend shall fill the space indicated by the minimum dimensions shown on the diagram.

FIGURE 19. Method of installing cover on type I, class 2, fixtures and lights with standard mounting.

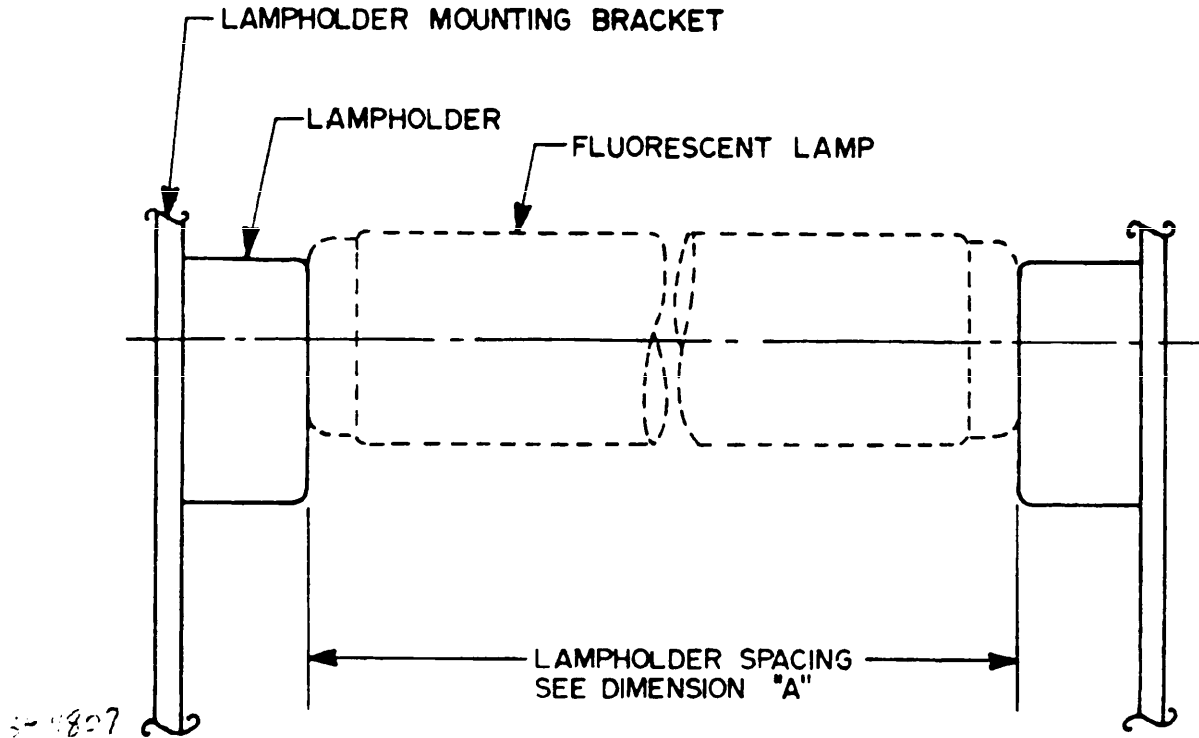
MIL-F-16377G(SH)



SM 11306

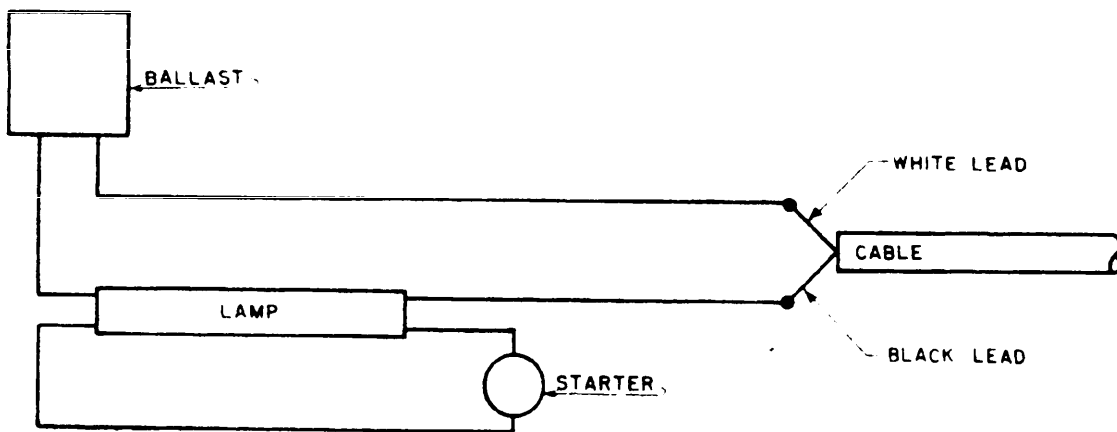
FIGURE 20. Airborne noise acceptable levels.

MIL-F-16377G(SH)



LAMP (WATTS)	DIMENSION "A" (INCHES) $\pm .015$ "
6	9.360
8	12.360
15	18.150
20	24.150

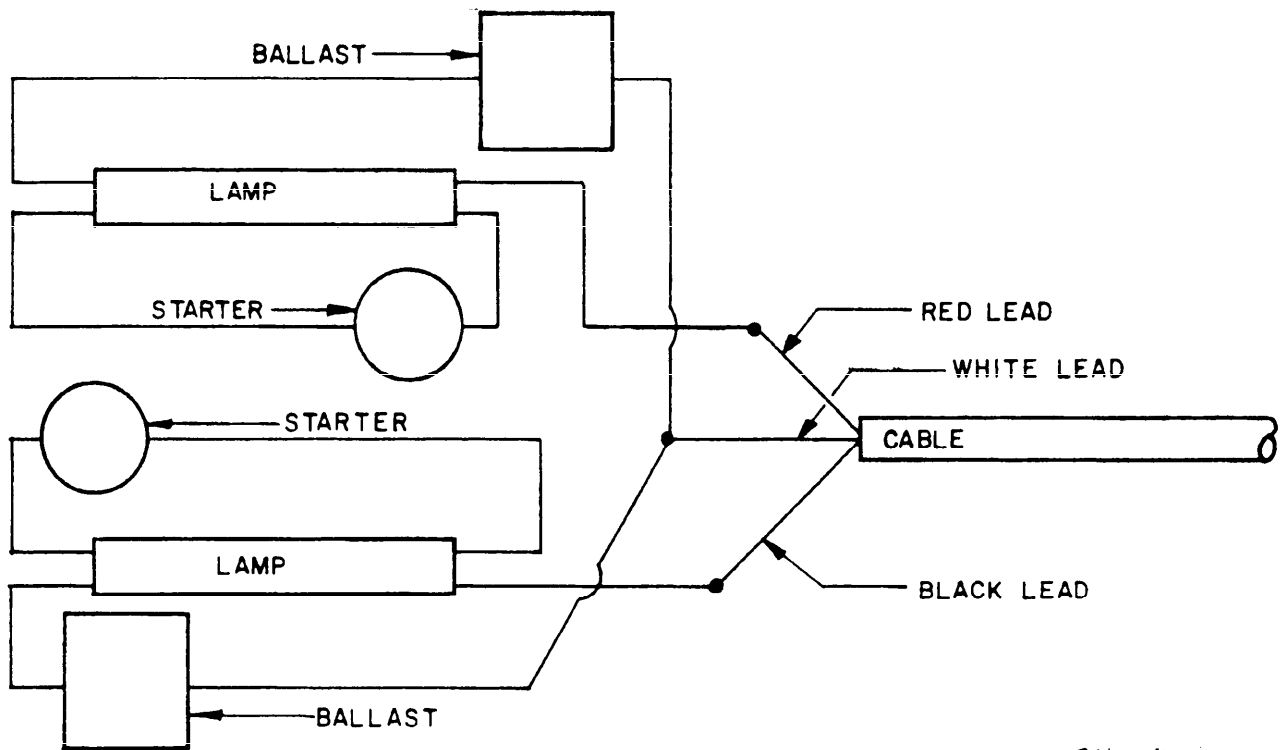
FIGURE 21. Lampholder spacing.



S.M. 11 80.

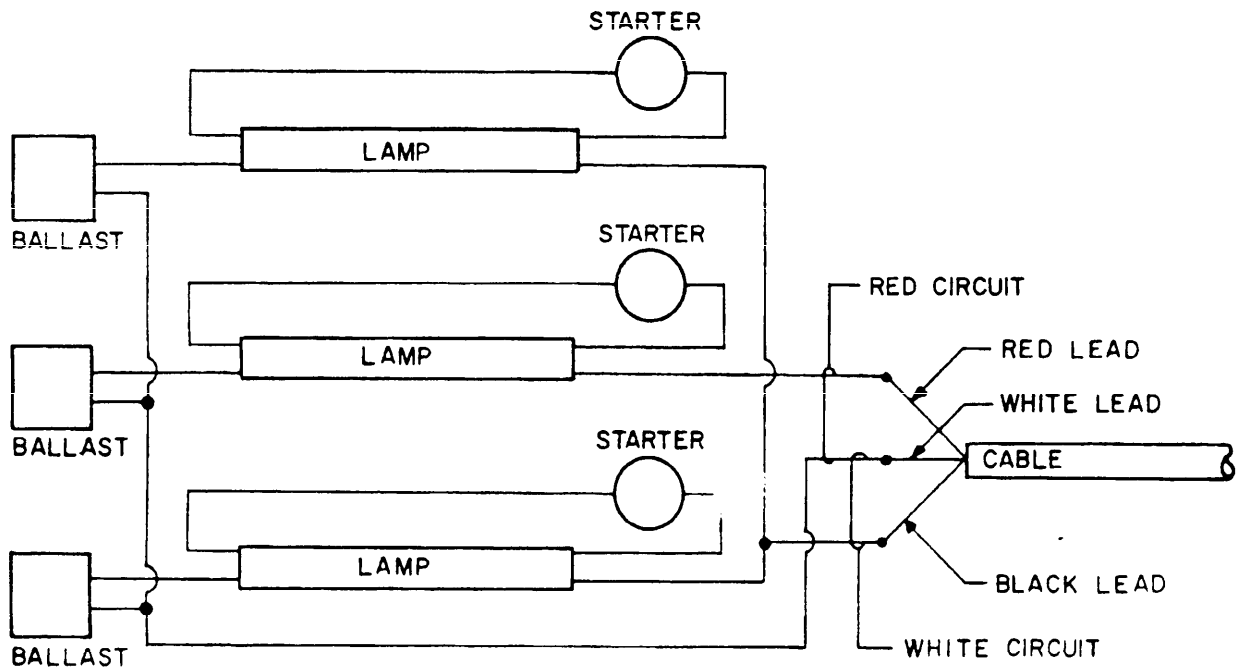
FIGURE 22. Wiring diagram to operate one fluorescent lamp.

MIL-F-16377G(SH)



SH 1 SH 1

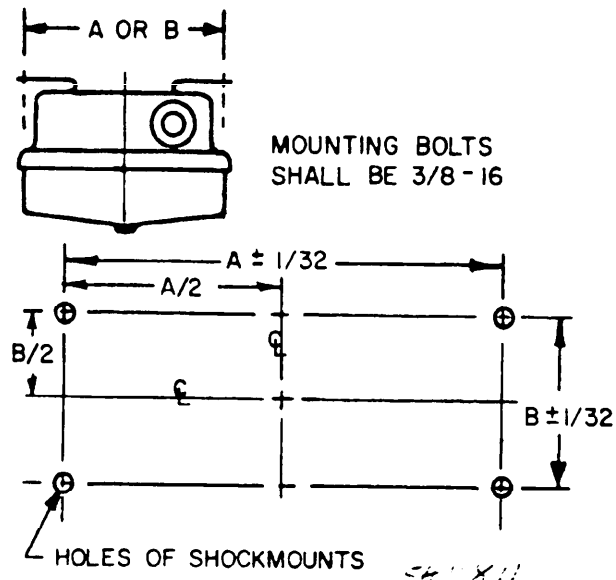
FIGURE 23. Wiring diagram to operate two fluorescent lamps.



SH 1 SH 1

FIGURE 24. Wiring diagram to operate three fluorescent lamps.

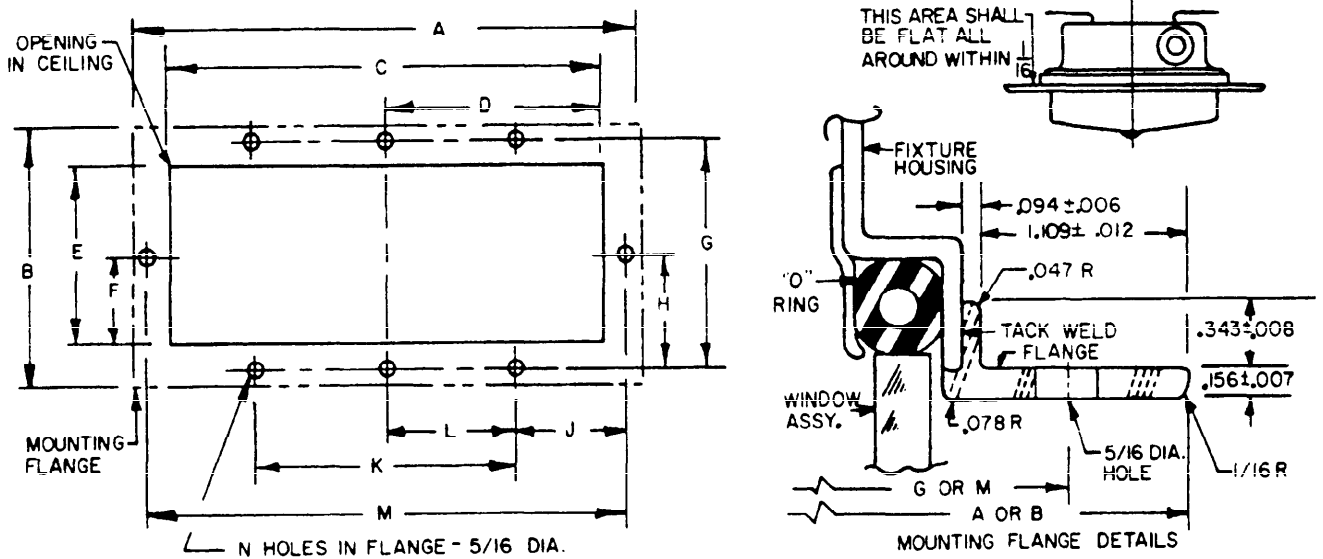
MIL-F-16377G(SH)



SPECIFICATION SHEET	SYMBOL NUMBER	A	B
MIL-F-16377/5	338.1, 339.1	13 7/8	4 3/4
MIL-F-16377/6	149.4	9 1/4	7 1/4
MIL-F-16377/7	70.3, 336	9 1/4	4 3/4
MIL-F-16377/8	331.1, 347.2	19 7/8	4 3/4
MIL-F-16377/9	73.3, 346.2	9 1/4	7 1/4
MIL-F-16377/10	145.4	19 7/8	7 1/4
MIL-F-16377/11	77.4, 344.2	19 7/8	7 1/4
MIL-F-16377/12	333.1, 341.1, 342.2	19 7/8	9 1/4
MIL-F-16377/14	80.1, 79.1	9 1/4	4 3/4
MIL-F-16377/65	81, 345.2	13 7/8	7 1/4
MIL-F-16377/66	82, 343.1	13 7/8	9 1/4

FIGURE 25. Mounting dimensions for standard mounting of fluorescent fixtures.

MIL-F-16377G(SH)



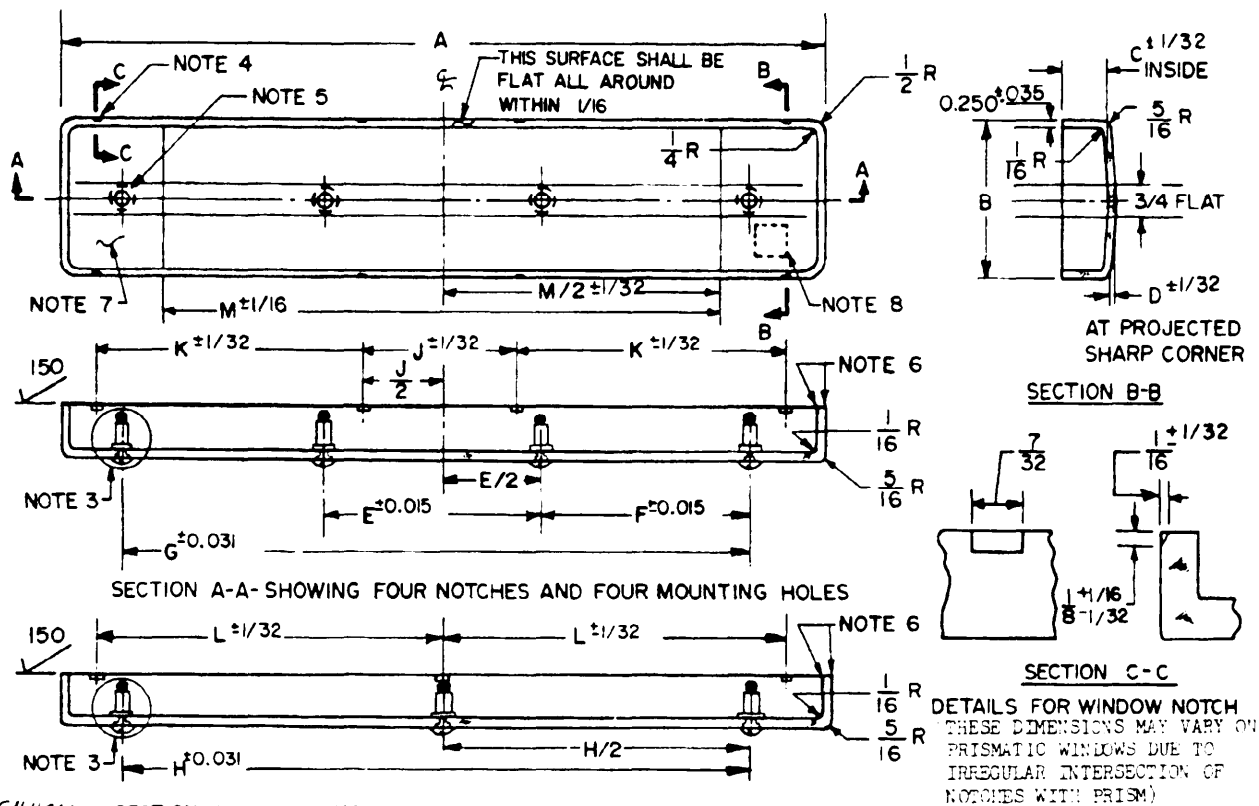
SPECIFICATION SHEET	SYMBOL NUMBER	A	B	C	D	F	F	G	H	J	K	L	M	N
MIL-F-16377/5	338.2 and 359.2	25 ⁹ / ₁₆	7 ¹ / ₄	23 ⁹ / ₁₆	11 ²⁵ / ₃₂	5 ¹ / ₄	2 ⁵ / ₈	6	3	5 ⁷ / ₃₂	13 ⁷ / ₈	6 ¹⁵ / ₁₆	24 ⁵ / ₁₆	A
MIL-F-16377/6	149.5	18 ¹¹ / ₁₆	9 ¹⁵ / ₁₆	16 ¹¹ / ₁₆	R ¹¹ / ₃₂	7 ¹⁵ / ₁₆	3 ³¹ / ₃₂	R ¹¹ / ₁₆	4 ¹¹ / ₃₂	4 ³ / ₃₂	9 ¹ / ₄	4 ⁵ / ₈	17 ⁷ / ₁₆	G
MIL-F-16377/7	70.4 and 336.1	19 ²⁹ / ₃₂	7 ¹ / ₄	17 ²⁹ / ₃₂	R ⁶¹ / ₆₄	5 ¹ / ₄	2 ⁵ / ₈	6	3	4 ¹⁵ / ₆₄	9 ¹ / ₄	4 ⁵ / ₈	18 ²¹ / ₃₂	C
MIL-F-16377/8	331.2 and 347.3	31 ⁹ / ₁₆	7 ¹ / ₄	29 ⁹ / ₁₆	14 ²⁵ / ₃₂	5 ¹ / ₄	2 ⁵ / ₈	6	3	5 ⁷ / ₃₂	19 ⁷ / ₈	9 ¹⁵ / ₁₆	30 ⁵ / ₁₆	A
MIL-F-16377/9	73.4 and 346.3	18 ¹¹ / ₁₆	9 ¹⁵ / ₁₆	16 ¹¹ / ₁₆	R ¹¹ / ₃₂	7 ¹⁵ / ₁₆	3 ³¹ / ₃₂	R ¹¹ / ₁₆	4 ¹¹ / ₃₂	4 ³ / ₃₂	9 ¹ / ₄	4 ⁵ / ₈	17 ⁷ / ₁₆	C
MIL-F-16377/10	145.5	31 ⁵ / ₁₆	9 ¹⁵ / ₁₆	29 ⁵ / ₁₆	14 ²¹ / ₃₂	7 ¹⁵ / ₁₆	3 ³¹ / ₃₂	R ¹¹ / ₁₆	4 ¹¹ / ₃₂	5 ³ / ₃₂	19 ⁷ / ₈	9 ¹⁵ / ₁₆	30 ¹ / ₁₆	A
MIL-F-16377/11	77.5 and 344.3	31 ⁵ / ₁₆	9 ¹⁵ / ₁₆	29 ⁵ / ₁₆	14 ²¹ / ₃₂	7 ¹⁵ / ₁₆	3 ³¹ / ₃₂	R ¹¹ / ₁₆	4 ¹¹ / ₃₂	5 ³ / ₃₂	19 ⁷ / ₈	9 ¹⁵ / ₁₆	30 ¹ / ₁₆	A
MIL-F-16377/12	338.2, 361.2 and 362.3	31 ⁵ / ₈	11 ⁷ / ₈	29 ⁵ / ₈	14 ¹³ / ₁₆	9 ⁷ / ₈	4 ¹⁵ / ₁₆	10 ⁵ / ₈	5 ⁶ / ₁₆	5 ¹ / ₄	19 ⁷ / ₈	9 ¹⁵ / ₁₆	30 ³ / ₈	A
MIL-F-16377/14	60.2 and 79.2	17 ⁴⁷ / ₆₄	5 ⁷ / ₃₂	16 ⁷ / ₈	R ⁷ / ₁₆	3 ⁷ / ₃₂	1 ³⁹ / ₆₄	3 ³¹ / ₃₂	1 ⁶³ / ₆₄	---	9 ¹⁵ / ₁₆	4 ³¹ / ₃₂	---	4
MIL-F-16377/65	81.1 and 345.0	25 ⁵ / ₁₆	9 ¹⁵ / ₁₆	23 ⁵ / ₁₆	11 ²¹ / ₃₂	7 ¹⁵ / ₁₆	3 ³¹ / ₃₂	R ¹¹ / ₁₆	4 ¹¹ / ₃₂	5 ³ / ₃₂	13 ⁷ / ₈	6 ¹⁵ / ₁₆	24 ¹ / ₁₆	A
MIL-F-16377/66	82.1 and 343.2	25 ⁵ / ₈	11 ⁷ / ₈	23 ⁵ / ₈	11 ¹³ / ₁₆	9 ⁷ / ₈	4 ¹⁵ / ₁₆	10 ⁵ / ₈	5 ⁵ / ₁₆	5 ¹ / ₄	13 ⁷ / ₈	6 ¹⁵ / ₁₆	24 ³ / ₈	A

N - represents the number of mounting holes in mounting flange.

SH 11812

FIGURE 26. Mounting dimensions for flush mounting of fluorescent fixtures.

MIL-F-16377G(SH)



SH11813 SECTION A-A - SHOWING THREE NOTCHES AND THREE MOUNTING HOLES

MILITARY PART NO.	MATERIAL	DIMENSION													NO. OF SECRG. SCR. ASSY	NO. OF NOTCHES EA. SIDE
		A	B	C	D	E	F	G	H	J	K	L	M			
M16377/5-001	Note 1	22.875	4.593	1/16	1/8				19.125	5/16	7/32		17	3	4	
M16377/5-002	Note 2	22.737	4.562	1/64	1/8				19.125	5/64	7/32		17	3	4	
M16377/7-001	Note 1	17.234	4.593	1/2	1/8			13.312				7/32	11	3	3	
M16377/7-002	Note 2	17.187	4.562	1/2	1/8			13.312				7/32	11	3	3	
M16377/8-001	Note 1	28.875	4.593	1/16	1/8			25.125	8/32	3/4		23	3	4		
M16377/8-003	Note 2	28.797	4.562	1/64	1/8			25.125	8/32	3/4		23	3	4		
M16377/9-001	Note 1	16.015	7.265	31/32	7/16			11.782				7/64	11	3	3	
M16377/9-003	Note 2	15.968	7.203	31/32	7/16			11.782				7/64	11	3	3	
M16377/11-001	Note 1	28.656	7.265	1/8	9/16	8.333	8.396	25.125		8/4	8/4		23	4	4	
M16377/11-003	Note 2	28.563	7.203	1/8	9/16	8.333	8.396	25.125		8/4	8/4		23	4	4	
M16377/12-001	Note 1	28.937	9.234	31/64	25/32	8.333	8.396	25.125		9/32	8/4		23	4	4	
M16377/12-004	Note 2	28.844	9.141	31/64	25/32	8.333	8.396	25.125		9/32	8/4		23	4	4	
M16377/65-001	Note 1	22.656	7.265	1/8	9/16	6.375	6.375	19.125		6/4	6/4		17	4	4	
M16377/65-002	Note 2	22.563	7.203	1/8	9/16	6.375	6.375	19.125		6/4	6/4		17	4	4	
M16377/66-001	Note 1	22.937	9.234	31/64	25/32	6.375	6.375	19.125		6/4	6/4		17	4	4	
M16377/66-002	Note 2	22.844	9.141	31/64	25/32	6.375	6.375	19.125		6/4	6/4		17	4	4	

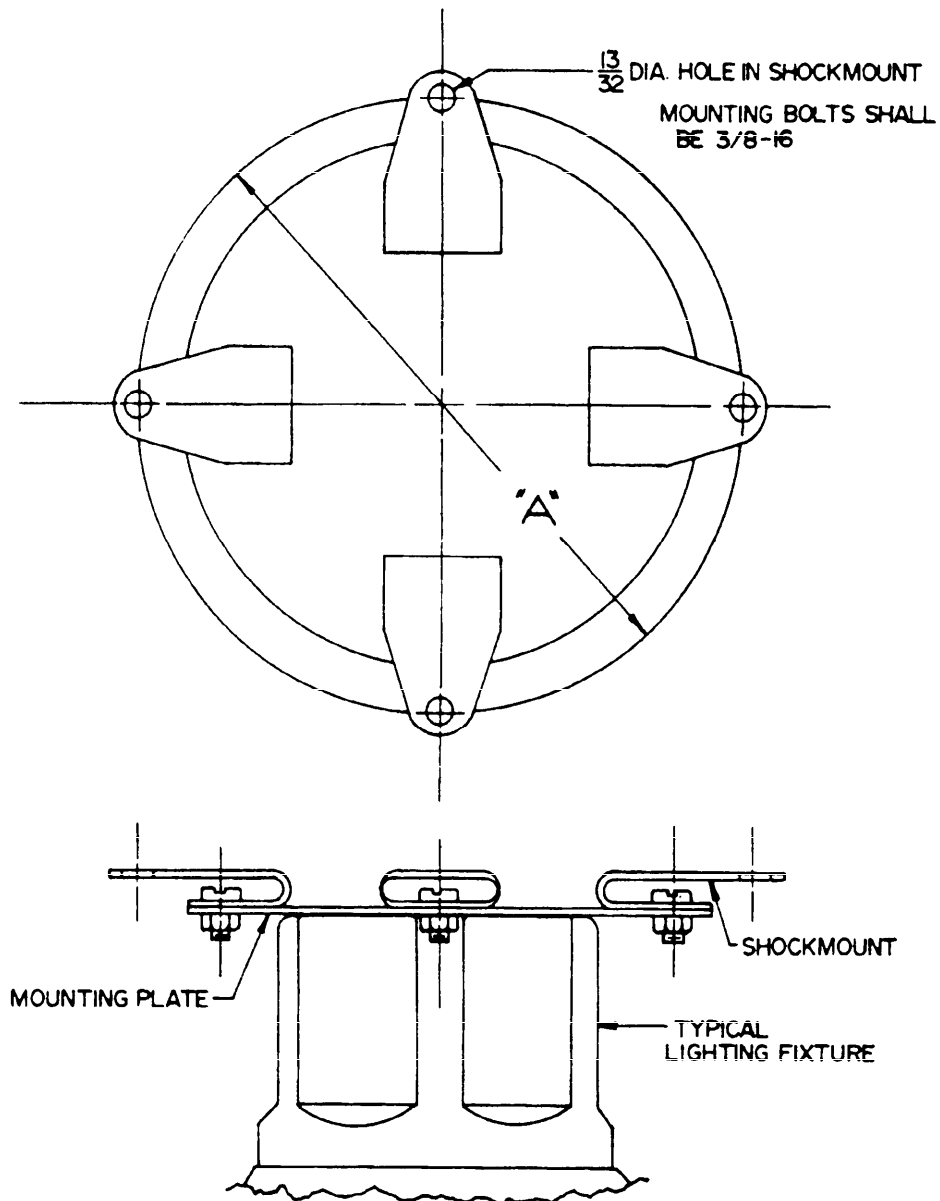
SH11813

NOTES:

1. Material shall be 1/4 inch thick, white translucent acrylic plastic, Type WTLS-4, Grade G of MIL-P-24191.
2. Material shall be 1/4 inch thick, clear prismatic acrylic plastic, Type CLEAR-2 of MIL-P-24191. The prisms shall be on the outside surface of the windows.
3. Short window securing screw assemblies in the number indicated on the table shall be installed in accordance with 2.7.4.3.
4. When required, notches in the number indicated on the table shall be filed as shown in accordance with 2.7.4.4.
5. Drill 0.091 diameter hole and counterbore opposite side 0.229 diameter, 0.050 deep. Break sharp edges on the inside surface on all holes.
6. Break sharp edges 1/64 of an inch around entire window.
7. The inside surface of both ends (bottom, sides and end) of windows with clear prismatic material shall be finished white in accordance with 2.8.4.1.
8. When required, one Type VI label shall be applied on the outside surface of the white translucent windows and on the inside surface of the clear and white prismatic windows in accordance with 2.7.4.3.

FIGURE 27. Window assemblies.

MIL-F-16377G(SH)



SPECIFICATION	SYMBOL	"A" DIA.
MIL-F-16377/20	64.1, 65	7-5/8
MIL-F-16377/21	89, 90.2	7-5/8
MIL-F-16377/22	94.1	7-5/8
MIL-F-16377/23	57, 57.1, 69, 69.1	7-5/8
MIL-F-16377/24	66.2	11-1/4
MIL-F-16377/25	48.2, 68.2	7-5/8
MIL-F-16377/26	112, 113	7-5/8
MIL-F-16377/64	67	7-5/8

FIGURE 28. Mounting dimensions for incandescent fixtures.

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