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(See 6.5)

MILITARY SPECIFICATION

WINDOWS, NON-ICING, LAMINATED FLAT GLASS, ELECTRICALLY HEATED WITH CONTROLS

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 non-icing, flat laminated, electrically heated glass windows contained in metal frames, with temperature controls necessary for operation. The windows are to provide clear vision aboard ships during cold weather operating conditions.

1.2 Classification. Controllers shall be of the following types, as specified (see 6.2.1):

Type I - Remote controller actuated by a temperature sensor embedded in the window.

Type II - Surface controller actuated by an integral temperature sensor for controller replacement on windows not having embedded sensors.

2. APPLICABLE DOCUMENTS

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

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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SPECIFICATIONS

FEDERAL

TT-C-490 - Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings.
TT-P-664 - Primer Coating, Synthetic, Rust-Inhibiting, Lacquer-Resisting.
TT-P-1757 - Primer Coating, Zinc Chromate, Low Moisture Sensitivity.
PPP-B-621 - Boxes, Wood, Nailed, and Lock-Corner.

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MIL-P-116 - Preservation-Packaging, Methods of.
MIL-S-901 - Shock Tests, H.I. (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
MIL-E-917 - Electric Power Equipment, Basic Requirements for (Naval Shipboard Use).
MIL-G-2857 - Glass, Heat-Treated, Glazing, Rectangular (For Bridge Windows).
MIL-G-3787 - Glass, Laminated, Flat; (Except Aircraft).
MIL-C-5015 - Connectors, Electric, "AN" Type, General Specification for.
MIL-E-15090 - Enamel, Equipment, Light-Gray (Formula No. 111).
DOD-P-15328 - Primer, (Wash), Pretreatment, (Formula No. 117 For Metals) (Metric).
MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Repair Parts; Packaging and Packing of.

STANDARDS

FEDERAL

FED-STD-406 - Plastics: Methods of Testing.

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-130 - Identification Marking of U.S. Military Property.
MIL-STD-167-1- Mechanical Vibration of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
MIL-STD-252 - Wired Equipment, Classification of Visual and Mechanical Defects.
MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.
MIL-STD-781 - Reliability Design Qualification and Productions Acceptance Tests: Exponential Distribution.
MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking, and Waterproofing; With Appropriate Test Methods.
DOD-STD-1399,- Section 300 Interface Standard for Shipboard Systems, Electric Power, Alternating Current (Metric).

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DRAWINGS

NAVAL SEA SYSTEMS COMMAND

805-1633251 - Window, Heated, 3/4 Inch Panel (CRES), Details, 19 by 25.
805-1633254 - Window, Heated, 2 Inch Panel (CRES), Details, 19 by 25.
805-1633257 - Window, Heated, 1/2 Inch Panel (CRES), Details, 19 by 25.
805-1633259 - Window, Heated, 1/2 Inch Panel, Hinged Frame (CRES) Assembly, 19 by 25.
805-1633260 - Window, Heated, 1/2 Inch Panel (CRES and Aluminum), Hinged Frame Details, 19 by 25.
805-1633261 - Window, Heated 1/2 Inch Panel, Fixed Frame (AL), 19 by 25.
805-1633262 - Window, Heated, 1/2 Inch Panel, Details (AL) 19 by 25.
805-1633263 - Window, Heated, 1/2 Inch Panel, Hinged Frame (AL) Assembly 19 by 25.
805-1633264 - Window, Heated, 1/2 Inch Panel, Details (AL), 19 by 25.
805-2226902 - Window, Heated Temperature Control and Glass Detail.
805-4353964 - Temperature Controller, Type II For Heated Windows (Surface Mounted Sensor).

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

UNIFORM CLASSIFICATION COMMITTEE
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, Illinois 60606.)

NATIONAL CLASSIFICATION BOARD
National Motor Freight Classification Classes and Rules

(Application for copies should be addressed to the ATA Tariff Section, 1616 P Street, N.W., Washington, DC 20036.)

(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.)

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3. REQUIREMENTS

3.1 Sample for first article inspection. Prior to beginning production a controller sample shall be tested as specified in 4.3 (see 6.3).

3.2 General requirements. Controllers shall be built to the general requirements of MIL-E-917. Ordinary maintenance in service shall not require special tools, excessively precise workmanship, or critical adjustments.

3.2.1 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and shall be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.3 Construction.

3.3.1 Windows. Windows shall be constructed of laminated glass which is free of all notches and of two or more plies of glass of glazing qualities conforming to MIL-G-2857. The laminate shall conform to class 1, type I of MIL-G-3787. This plastic shall have a 20 percent nominal plasticizer content. A parting medium may be used at the option of the contractor. Glass plies or plastic interlayer shall not be notched or drilled. The flat laminated glass panel shall be coated with a transparent electrically conductive stannic oxide film. Contact with the conductive film shall be maintained through bus bars that have been fired to the glass substrate prior to application of the film. Windows shall contain two temperature sensors (one spare) embedded within the plastic interlayer and shall use a type I controller (see 1.2).

3.3.1.1 Sensor characteristics. Embedded sensors used with type I controllers shall have the following characteristics:

(a) Sensor material: Nickel wire.
(b) Resistance: 326 ohms $\pm$ 1 percent at 90°F.
(c) Temperature coefficient: 0.003 ohms/ohm/°F nominal at 90°F (measured at the input to the controller).
(d) Size: Approximately 1-1/2 inches by 1-1/2 inches.
(e) Location: Conforming to Drawing 805-2226902.

3.3.1.2 Frames. The glass shall be contained in frames of corrosion resisting steel (CRES), bronze, or aluminum as specified (see 6.2.1). Details shall be as indicated on Drawings 805-1633251, 805-1633254, 805-1633257, 805-1633259, 805-1633260, 805-1633261, 805-1633262, 805-1633263, and 805-1633264, as applicable. Gaskets of 1/8-inch thickness shall be provided to enable window frames to be installed.

3.3.1.3 Gaskets. The glass shall be fitted in the frame by means of a rubber channel gasket of 30 to 40 durometers. Corners of gaskets shall be vulcanized or otherwise sealed against water penetration.

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3.3.1.4 Junction box. The junction box used for terminating sensor leads shall be of steel and painted in accordance with either of the following methods:

(a) One coat of wash pretreatment in accordance with DOD-P-15328 (0.0005- to 0.0007-inch thick).
(b) A hot dip-tank phosphate treatment conforming to type I of TT-C-490, followed by one coat of primer in accordance with TT-P-664 or TT-P-1757 (0.0002- to 0.001-inch thick).

Primer shall be topcoated with two coats (each approximately 0.001-inch thick) of gray enamel conforming to class 2 of MIL-E-15090.

3.3.1.5 Glass edge finish. Corners shall be nipped, sharp edges shall be seamed, and flares shall be ground flat.

3.3.1.6 Glass edge contour. The contour of any edge shall not, when unstressed, deviate more than 0.030 inch in a span or distance of 12 inches.

3.3.1.7 Temper. Each uncoated panel in the laminate shall have minimum average temper of 1800 nanometer (nm) units, and each coated panel in the laminate shall have a minimum average temper of 1400 nm units.

3.3.1.8 Optical and mechanical properties. Optical and mechanical properties of glass not specified herein shall be in accordance with class 1, type I of MIL-G-3787.

3.3.1.9 Original luminous transmittance. The original luminous transmittance shall be at least 78 percent for assemblies of overall thicknesses up to 5/8 inch, at least 70 percent for assemblies from 5/8 to 1-1/4 inches, and at least 65 percent for assemblies 1-1/4 to 2 inches when tested as specified in method 3022 of FED-STD-406 using illuminant C.

3.3.1.10 Resistance to delamination. When the windows are tested as specified in 4.6.1, there shall be no chipping or electrical failure, and delamination shall not be evident beyond 1 inch from the edge of the glass.

3.3.1.11 Film, electrical conducting. Unless otherwise specified (see 6.2.1), the electrical conducting film shall be applied on the inside surface of the glass that is to be exposed to the weather. With the voltage specified (see 6.2.1), the resistance value of the film shall provide a wattage of 350 $\pm$ 50 watts per square foot for the window. Embedded sensing elements shall be located at control points as specified in the applicable drawing specified in 3.3.1.2. The current drawn by any single window shall not exceed 10.0 amperes (A), nor be less than 1.50 A. The desired power dissipation and tolerance shall be as specified (see 6.2.1).

3.3.1.12 Panel terminals. Panel terminals shall consist of two braided or stranded copper leads, soldered or otherwise securely attached to the internal busses.

3.3.1.13 Bus construction. There shall be internal bus bars of a size, shape, and material conforming to this specification which shall afford maximum visibility. The bus bars shall be fired on the glass prior to application of

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the conductive film and shall make intimate electrical contact with the film. Busses shall be inset from the edge of the panel as indicated on the applicable drawing specified in 3.3.1.2.

3.3.1.14 Continuity. When tested in accordance with 4.6.3.1, there shall be no opens, shorts, or grounds.

3.3.1.15 Electrical isolation. When tested as specified in 4.6.3.2, results shall indicate complete electrical isolation between the sensing element and its environment.

3.4 Controllers. Controller shall be of steel and shall be a solid state design. Relays, thermostats, and mercury devices shall not be used. Controllers shall be free of defects as specified in 4.5.2. The mounting details of the controller shall be in accordance with Drawings 805-2226902 and 805-4353964. Controller shall be "ON-OFF" type utilizing both halves of the voltage wave, and shall not impose a ground on the power system to which it is connected.

3.4.1 Type I controller. Controller shall be actuated by a temperature sensor embedded in the window via the junction box (see 3.3.1.4). Plastic shall not be drilled to insert sensors.

3.4.2 Type II controller (for retrofit use only). Controller shall be actuated by a temperature sensor contacting the inside surface of the window. Windows with a notched area shall have temperature measured in the notched area.

3.4.2.1 Sensor housing. Sensor used with type II controller shall be mounted in a protective housing protruding from the back of the controller. Sensor housing shall be spring loaded against the surface of the window to provide intimate thermal contact with the interior side of the glass panel.

3.4.3 Controller operation. Type I and type II controllers shall be actuated by sensors and shall be capable of handling 4.4 kilowatts (kW) maximum at 440 volts root mean square (Vrms). The controller shall be operable at sensing element temperatures as low as minus 20°F, shall open the circuit when the temperature at the sensing element reaches 90°F ± 10°F, and shall close the circuit at a sensing element temperature no greater than 70°F. The controller shall open the circuit should the following occur:

(a) Open circuit in sensing element.
(b) Shorted circuit in sensing element.

Operation of controller shall be tested as specified in 4.6.4.2 and 4.6.4.3. The controller shall be in a steel dripproof enclosure and fitted with connectors as shown in Drawings 805-2226902 and 805-4353964. Mating connectors shall be supplied by the contractor.

3.4.4 Reliability. When the controllers are tested in accordance with 4.6.5, the Mean Cycles Between Failure (MCBF) shall be not less than 400,000.

3.4.5 Electromagnetic interference characteristics. The electromagnetic interference characteristics of the controller shall be tested as specified in 4.6.4.5.

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3.4.6 Interchangeability. Like controllers, assemblies, subassemblies, and replaceable parts shall conform to the interchangeability requirements of MIL-E-917 (see 4.6.6). In no case shall parts be physically interchangeable or reversible unless such parts are also interchangeable or reversible with regard to function, performance and strength.

3.4.7 Connectors. Ship's power to the junction box and controller shall be by means of an electrical connector in accordance with MIL-C-5015. Size of connector shall be as shown on Drawings 805-2226902 and 805-4353964. Mating connectors shall be furnished by the contractor.

3.4.8 Identification plate. Each controller shall be provided with an identification plate containing the manufacturer's name, catalog number, National Stock Number (NSN) (if applicable), voltage, frequency, and maximum current rating. The plate shall be located on the outside of the controller. Terminals in the controller shall be permanently and clearly marked with an identification as to the function of each terminal. The identification plate shall comply with the requirements of MIL-STD-130.

3.4.9 Painting. The controller shall be painted as specified in 3.3.1.4.

3.5 Voltage. Unless otherwise specified (see 3.3.1.11 and 6.2.1), windows and their controllers shall operate on 440 Vrms, 60 hertz (Hz), single phase, and shall provide up to 10 A to the window heater element. The equipment shall perform as specified herein when operated with shipboard type I power as specified in DOD-STD-1399, Section 300.

3.6 Load. Satisfactory operation at different levels shall be demonstrated as specified in 4.6.4.4.

3.7 Thermal shock. The window shall withstand thermal shock when tested as specified in 4.6.2.

3.8 Power constants. Power constants for windows shall be defined as follows:

(a) $Kh = \dfrac{\text{Power at the hot spot}}{\text{Power at the control point}}$

(b) $Ka = \dfrac{\text{Average power}}{\text{Power at the control point}}$

(c) $Km = \dfrac{\text{Average power}}{\text{Power at the hot spot}}$

The power constants shall be:

(d) Kh equal to or less than 1.60
(e) Ka equal to or greater than 0.65
(f) Km equal to or greater than 0.50

Power constants shall be determined by the glass manufacturer before lamination of the glass. Records shall be available for inspection upon request of the contracting activity.

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3.9 Vibration. Controller shall meet the requirements of MIL-STD-167-1 for type I environmental vibration up to and including 50 Hz. When tested as specified in 4.6.7, the units shall show no evidence of breakage, permanent deformation, or loosening of parts, and shall retain their serviceability.

3.10 Shock. When tested as specified in 4.6.8, the units shall show no evidence of breakage, permanent deformation, or loosening of parts, and shall retain their serviceability.

3.11 Technical data. The contractor shall prepare technical manuals in accordance with the data ordering documents included in the contract or order (see 6.2.2). Two manuals shall be provided for each ship in which the windows are to be installed.

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.

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

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

4.3 First article inspection. First article inspection shall consist of the examination and tests specified in table I. Tests shall be conducted in the order shown.

TABLE I. First article inspection (for controllers only).

Examination or test	Requirement paragraph	Test paragraph
Visual and mechanical examination	3.2, 3.4, 3.4.1, 3.4.2, 3.4.2.1, 3.4.8, and 3.4.9	4.5.2
Controller operation	3.4.3	4.6.4.2 and 4.6.4.3
Reliability	3.4.4	4.6.5
Electromagnetic interference characteristics	3.4.5	4.6.4.5
Vibration	3.9	4.6.7
Shock	3.10	4.6.8

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4.3.1 First article inspection report. A first article inspection report shall be prepared in accordance with the data ordering document (see 6.2.2).

4.4 Quality conformance inspection. Quality conformance inspection shall consist of group A and group B inspections.

4.4.1 Inspection lot. An inspection lot shall consist of windows or controllers of the same type, construction, and electrical requirements produced under essentially the same conditions and offered for inspection at one time.

4.4.1.1 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table II in the order shown.

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TABLE II. Group A inspection.

Examination or test	Requirement paragraph	Test paragraph	AQL	
			Major	Minor
Windows:				
Visual construction and mechanical examination	3.3.1 through 3.3.1.9, 3.3.1.11 through 3.3.1.13, and 3.4.1	4.5.1	1.0 percent	4.0 percent
Vibration	3.9	4.6.7	1.0 percent	4.0 percent
Shock	3.10	4.6.8	1.0 percent	4.0 percent
Electrical:				
Continuity	3.3.1.14	4.6.3.1	1.0 percent combined	---
Electrical isolation	3.3.1.15	4.6.3.2		
Sensor characteristics	3.3.1.1	4.6.4.1		
Controllers:				
Visual and mechanical examination	3.2, 3.4, 3.4.1, 3.4.2, 3.4.2.1, 3.4.7, 3.4.8, and 3.4.9	4.5.2	1.0 defect per hundred units	4.0 defects per hundred units
Vibration	3.9	4.6.7	1.0 defect per hundred units	4.0 defects per hundred units
Shock	3.10	4.6.8	1.0 defect per hundred units	4.0 defects per hundred units
Interchangeability	3.4.6	4.6.6	4.0 percent	S-4
Load	3.6	4.6.4.4	1.0 percent	---

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4.4.1.1.1 Sampling plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105 for general inspection, level II, except for interchangeability examination which shall be level S-4. The acceptable quality level shall be as specified in table II. Major and minor defects shall be as specified herein and in MIL-STD-252.

4.4.1.1.2 Rejected lots. If an inspection lot is rejected, the contractor may rework it to correct the defects or screen out the defective units and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be kept separate from new lots and shall be clearly identified as reinspected lots.

4.4.1.2 Group B inspection. Group B inspection shall consist of the tests specified in table III in the order shown. Group B inspection shall be made on sample units which have passed group A inspection.

TABLE III. Group B inspection.

Examination or test	Requirement paragraph	Test paragraph	AQL and sampling level
Windows:			
Glass edge flatness	3.3.1.6	4.5.1	4.0 percent S-4
Temper	3.3.1.7	4.5.1	4.0 percent S-2
Optical and mechanical properties	3.3.1.8	4.5.1	4.0 percent S-4
Original luminous transmittance	3.3.1.9	4.5.1	4.0 percent S-4
Resistance to delamination	3.3.1.10	4.6.1	6.5 percent S-2
Thermal shock	3.7	4.6.2	6.5 percent S-2
Controllers:			
Controller operation	3.4.3	4.6.4.2 and 4.6.4.3	4.0 percent S-4

4.4.1.2.1 Sampling plan. Sampling plan shall be in accordance with MIL-STD-105 for special inspection levels. The AQLs and inspection level shall be in accordance with table III.

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4.4.1.2.2 Disposition of samples. Sample units which have been subjected to and passed group B inspection, may be delivered on the contract or order.

4.4.1.2.3 Rejected lots. If an inspection lot is rejected, the contractor may rework it to correct the defects or screen out the defective units and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be kept separate from new lots and shall be clearly identified as reinspected lots.

4.5 Examination.

4.5.1 Windows. Windows shall be examined to determine conformity to the applicable requirements of class 1, type I of MIL-G-3787 and this specification. Windows not meeting the requirements of 3.3.1 herein shall be rejected.

4.5.2 Controllers. Controllers shall be examined for the defects listed in MIL-STD-252, as applicable.

4.6 Tests.

4.6.1 Resistance to delamination. Windows shall be cold-soaked at a temperature not warmer than minus 20°F for a sufficient length of time to insure a uniform temperature throughout the thickness of the windows. The windows may be tested in a rigid fixture. Windows shall be examined to determine conformity to requirements of 3.3.1.10.

4.6.2 Thermal shock. The window shall be mounted on a cold chamber so that the heated face is on the cold side and the opposite face is at laboratory ambient with the cold side maintained at minus 20°F and held for a period of 16 hours for stabilization. Specified voltage shall be applied through a controller for 30 minutes, and then the voltage removed for a period of 3-1/2 hours. This shall be repeated for a total of 10 cycles. As a minimum, the first and tenth cycle will be observed to verify deicing capability of the window.

4.6.3 Electrical tests (windows).

4.6.3.1 Continuity. Window circuit continuity shall be checked visually and electrically as required to determine conformity to requirements of 3.3.1.14.

4.6.3.2 Electrical isolation. Electrical isolation between the sensing element and its environment shall be tested as follows to determine conformity to requirements of 3.3.1.15:

(a) The conventional high potential dielectric strength test shall be performed. A potential of 1500 Vrms shall be applied and maintained for one minute between each terminal of the sensing element and each terminal of the load. The circuitry associated with the sensing element shall be protected from the high potential during the test.

(b) For non-icing windows having metal inserts or frames, the test specified in (a) above shall be performed. Potential shall be applied between each sensing element terminal and the metal inserts or frames of the windows.

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4.6.4 Electrical tests (controllers).

4.6.4.1 Sensor characteristics. The resistance of the embedded sensing element shall be tested with an ohmmeter to determine conformity to its rating as specified in 3.3.1.1.

4.6.4.2 Controller operation. The controller shall be tested by mounting the window in such a way that the temperature on the outboard side of the window is low enough to cause the controller to cycle, applying the rated voltage to the controller and window assembly for a period of 24 hours (minimum 200 cycles). The temperature shall be recorded at the sensing element and shall be from 70°F to 100°F. Results of tests shall be in conformity to requirements of 3.4.3.

4.6.4.3 Open or shorted sensing element. The fail-safe function of the controller shall be tested by opening and shorting the sensing element circuit with rated voltage applied. Results of tests shall be in conformity to requirements of 3.4.3.

4.6.4.4 Load. Controller operation shall be demonstrated at current values of 1.5 A, 4.0 A, and 10.0 A (10 cycles at each current level), when a variable resistance load is applied across the controller.

4.6.4.5 Electromagnetic interference. The controller shall be tested as specified in MIL-STD-461 for class IIB and RE01.

4.6.5 Reliability. Controllers shall be tested at the rated voltage and frequency in accordance with test plan III of MIL-STD-781. The load shall be adjusted so that one-third of the cycling shall be at 1.5 A, one-third of the cycling at 4.0 A, and the remainder at 10.0 A. The total test time shall be in accordance with test plan III of MIL-STD-781, but expressed as MCBF.

4.6.6 Interchangeability. The dimensions listed below shall be gaged or measured to determine conformity to the physical interchangeability requirement of 3.4.6:

(a) External and internal dimensions of cases, covers, and insertable assemblies, when such dimensions affect mating of parts.
(b) Location of hinges and fasteners on separable parts or assemblies which must mate, such as cases, covers, and mountings.
(c) Location of connectors, locking pins, fasteners, slides and mountings which receive mating parts of plug-in assemblies and major units; and location of the mating parts on the plug-in assembly or major unit.

4.6.7 Vibration. Windows and controllers shall be tested in accordance with MIL-STD-167-1, type I vibration. Type II controller may be tested mounted on the window. Type I vibration tests described in MIL-STD-167-1 require that equipment be tested and that resonances be noted. Resonance is defined as that condition under which the vibration amplitude of the equipment under test is equal to or greater than 2.0 times the values denoted in the vibratory displacement of environmental vibration table in MIL-STD-167-1. The resonance endurances tested shall be those determined in accordance with the above. The total resonant frequency endurance test time shall be at least 2 hours at the

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resonant frequencies. Thus, if a total of twelve resonant frequencies, as defined herein, are noted for the three test orientations, each of the twelve frequencies shall be endurance tested for at least 10 minutes.

4.6.8 Shock. Windows and controllers shall be tested in accordance with with MIL-S-901, grade A. Type II controller shall be tested mounted on the window.

4.7 Inspection of preparation for delivery. Sample packages and packs and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

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

5.1 Preservation-packaging. Preservation-packaging shall be level A or C, as specified (see 6.2.1).

5.1.1 Level A.

5.1.1.1 Window assemblies. Window assemblies shall be individually unit protected in accordance with method III of MIL-P-116.

5.1.1.1.1 Talc/talcum used in the packaging process of item(s) shall be free of asbestos and asbestiform-like materials.

5.1.1.2 Controls. Controls and electrical cable shall be preserved-packaged in accordance with the level A requirements of MIL-E-17555.

5.1.2 Level C. Preservation-packaging of window glass, assembled units, and controls shall afford protection against corrosion, deterioration, and physical damage during shipment from the supply source to the first receiving activity for immediate use. The contractor's normal preservation-packaging methods may be utilized when such meets the requirements of this level.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.2.1).

5.2.1 Assembled units.

5.2.1.1 Level A. The assembled units packaged as specified shall be packed in nailed or locked-corner wood boxes conforming to PPP-B-621, class 2. Box closure shall be as specified in the appendix to the box specification. The gross weight of shipping containers shall not exceed 200 pounds, except where the weight of a single unit exceeds this weight.

5.2.1.2 Level B. The assembled units packaged as specified shall be packed in nailed or lock-corner wood boxes conforming to PPP-B-621, class 1. Box closure shall be as specified in the appendix to the box specification. The gross weight of shipping containers shall not exceed 200 pounds, except where the weight of a single unit exceeds this weight.

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5.2.2 Controls. Controls and electrical cable preserved-packaged as specified (see 6.2.1) shall be packed within the shipping container as required for the assembled units.

5.2.3 Anchoring, blocking, bracing, and cushioning. Anchoring, blocking, bracing, and cushioning as required, shall be provided to prevent movement and damage of container contents during storage, handling, and transit, and shall conform to MIL-STD-1186.

5.2.4 Level C. Items, preserved-packaged as specified (see 6.2.1), shall be packed in containers acceptable to the common carrier which will insure safe delivery at destination in a satisfactory condition at the lowest applicable rate. Containers, packing, or method of shipment shall comply with Uniform Freight or National Motor Freight Classification Rules or Regulations or other carrier rules as applicable to the mode of transportation.

5.3 Marking. In addition to any special marking required, interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129 (see 6.2.1).

5.4 Window glass. Window glass, when acquired separately, shall be prepared for shipment in accordance with the applicable glass commodity specification (see 6.2.1).

6. NOTES

6.1 Intended use. Non-icing windows are intended for use in pilot houses or similar locations in Naval ships or shore installations where constant clear vision is required under icing and fogging conditions down to minus 20°F with a 40 knot wind and an ice accumulation rate of 6 inches per hour.

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 of controller (see 1.2).
(c) Material of frame (see 3.3.1.2).
(d) If electrical conducting film is to be applied other than on the inside surface of the glass (see 3.3.1.11).
(e) Voltage and current rating of window (see 3.3.1.11 and 3.5).
(f) Amount of power dissipation (see 3.3.1.11).
(g) Level of preservation-packaging and packing required (see 5.1 and 5.2).
(h) Special marking required (see 5.3).
(i) Preparation for delivery requirements for window glass (see 5.4).
(j) Thickness, exterior dimensions of the glass, and clear opening dimensions of the window.
(k) Location of the heating film.

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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:

Paragraph	Data requirements	Applicable DID	Option
3.11	Manual, technical, standard	DI-M-2044	Type I of MIL-M-15071
4.3.1	First article inspection report	DI-T-4902	---

(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.)

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 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

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

6.5 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.

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