

INCH-POUND

MIL-DTL-3459E

15 April 2019

SUPERSEDING

MIL-W-3459D

18 April 1990

DETAIL SPECIFICATION

WIPERS, WINDOW, ELECTRIC, PENDULUM-TYPE
(MARINE SERVICE, HEAVY-DUTY)

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

1. SCOPE

1.1 Scope. This specification covers heavy-duty electric window wipers for surface ships (marine service) that are pendulum-type and either single-blade or multi-blade.

1.2 Classification. Window wipers are furnished in the following design as specified (see 6.2).

- a. Single-blade.
- b. Multi-blade.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

COMMERCIAL ITEM DESCRIPTIONS

- A-A-59581 - Bearing, Ball, Annular, Single Row, Radial, Non-Filling Slot, Diameters Under 10 MM
A-A-59583 - Bearing, Ball, Annular, Single Row, Radial, Non-Filling Slot, Dimension Series 10

DEPARTMENT OF DEFENSE SPECIFICATIONS

- MIL-DTL-901 - Shock Tests, H.I. (High-Impact) Shipboard Machinery, Equipment, and Systems, Requirements for
MIL-DTL-917 - Electric Power Equipment, Basic Requirements for
MIL-DTL-2036 - Enclosures for Electric and Electronic Equipment, Naval Shipboard

Comments, suggestions, or questions on this document should be addressed to Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

MIL-DTL-3459E

- MIL-DTL-2212 - Contractors and Controllers, Electric Motor AC or DC, and Associated Switching Devices
- MIL-DTL-3661 - Lampholders, Indicator Lights, Indicator Light Housings, and Indicator Light Lenses, General Specification for
- MIL-L-3661/8 - Housings, Indicator-Light, Style LH76
- MIL-L-3661/14 - Lenses, Indicator-Light, Dripproof, Style LC14
- MIL-DTL-15024 - Plates and Tags for Identification of Equipment, General Specification for
- MIL-P-15024/5 - Plate, Identification
- MIL-C-15726 - Copper-Nickel Alloy, Sheet, Plate, Strip, Bar, Rod and Wire
- MIL-W-18445 - Windows, Non-Icing, Laminated Flat Glass, Electrically Heated with Controls

DEPARTMENT OF DEFENSE STANDARDS

- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I – Environmental and Type II – Internally Excited)
- MIL-STD-461 - Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
- MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-889 - Dissimilar Metals
- MIL-STD-1399-300-1 - Department of Defense Interface Standard, Section 300, Part 1, Low Voltage Electric Power, Alternating Current
- MIL-STD-1474 - Noise Limits

(Copies of these documents are available online at <https://quicksearch.dla.mil>.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR QUALITY (ASQ)

- ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of this document are available online at www.asq.org.)

ASTM INTERNATIONAL

- ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes
- ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings
- ASTM B108/B108M - Standard Specification for Aluminum-Alloy Permanent Mold Castings
- ASTM B369 - Standard Specification for Copper-Nickel Alloy Castings
- ASTM D5948 - Standard Specification for Molding Compounds, Thermosetting

(Copies of these documents are available online at www.astm.org.)

MIL-DTL-3459E

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA MG 1 - Motors and Generators

(Copies of this document are available online at www.nema.org.)

SAE INTERNATIONAL

SAE AS7928 - Terminals, Lug: Splices, Conductor: Crimp Style, Copper, General Specification for

(Copies of this document are available online at www.sae.org.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specified exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Construction.

3.2.1 General construction. The wiper system shall consist of a totally enclosed drive mechanism, with an apparatus for cleaning the exterior surface of windows and windshield glazing and shall also be fitted with the necessary devices and controls to actuate and arrest operations. Component parts of the wiper system shall consist of a motor, drive arm assembly, connecting linkage mechanism, control provisions, and blade assembly. The wiper system shall be driven by a motor actuated by a conveniently located control unit to operate the wiper by which the operator may vary the frequency or speed of the wiping cycle. Each wiper shall have a separate control unit that shall provide two or more frequencies or speeds of continuous operation. The systems shall be constructed so that no parts will work loose in service. The control unit, when energized, shall operate the wiper, a heated arm, and a blade assembly that will follow a pendulum motion. Wipers shall be fitted with a mechanical linkage to maintain the blade in a vertical position throughout the arc travel when specified (see 6.2). Each part shall be built to withstand strains, jars, vibrations, and other conditions incident to ship motion or environment. The wiper system shall be designed for operation in temperatures as low as 20 °F and as high as 120 °F.

3.2.1.1 Materials. Parts exposed to the weather shall be made of 90-10 copper-nickel alloy in accordance with ASTM B369 or MIL-C-15726; or for arms and stuffing tube, corrosion-resisting steel in accordance with ASTM A276/A276M, type 316. Drive mechanism housing shall be aluminum in accordance with ASTM B108/B108M, alloy designation A356 or 513 or ASTM B85/B85M, alloy designation A360. Phenolic molding compound (ASTM D5948, type CFI-40) may be substituted when specified for "interior use only". The selection of metals for use in electronic equipment shall be made in accordance with MIL-STD-889. When electronic design requirements preclude the insulation of incompatible metal combinations as identified in MIL-STD-889, specific attention shall be made to isolating the combination from the exterior environment. When the design requires dissimilar metals to be in contact, an insulating material compatible to each metal shall be used to separate the metals. Insulation material is not required between corrosion-resistant steel inserts and aluminum castings when the inserts are integrally encased into the aluminum. Plastic sleeves and separators for penetration in ship's structure shall be provided to eliminate electrolytic corrosion between dissimilar metals in the wiper system and ship's structure. Spur and worm gearing shall be of steel conforming to ASTM A276/A276M, type 316.

3.2.1.2 Protective treatment. Materials used in construction of wiper systems that are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service usage, shall be protected against such deterioration in a manner that will in no way prevent compliance with the requirements of this specification. Metals that are not inherently corrosion-resistant, as defined in MIL-DTL-917, shall be processed (treated, plated, or painted) in accordance with MIL-DTL-917 to provide corrosion resistance protection adequate to prevent deterioration. The use of any protective coating that will crack, chip, or scale with age or extremes of climatic and environmental conditions shall be avoided.

3.2.1.3 Orientation. Components of the drive system shall operate in any position or angle.

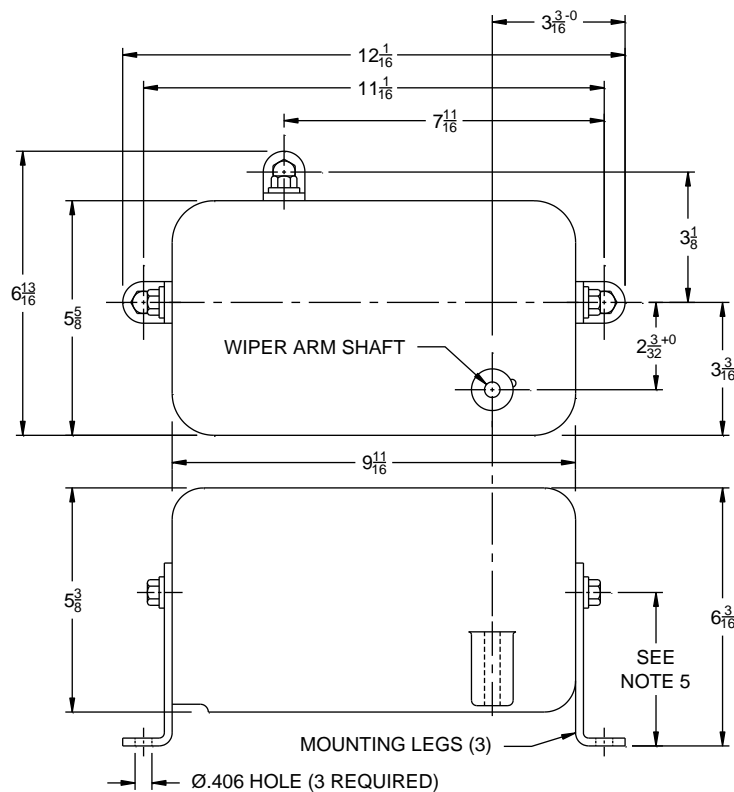
MIL-DTL-3459E

3.2.1.4 Interchangeability. 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.

3.2.1.5 Weight. Weight of a complete single-blade wiper system shall be minimized and shall not exceed 25 pounds. Weights of additional components necessary for multi-blade systems shall be consistent with the weight of a single-blade wiper system.

3.2.1.6 Dimensions. Wiper drive housing assembly, envelope dimensions, and mounting holes shall conform to the dimensions shown on [figure 1](#). Control box, envelope dimensions, and mounting holes shall conform to the dimensions shown on [figure 2](#).

3.2.1.7 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

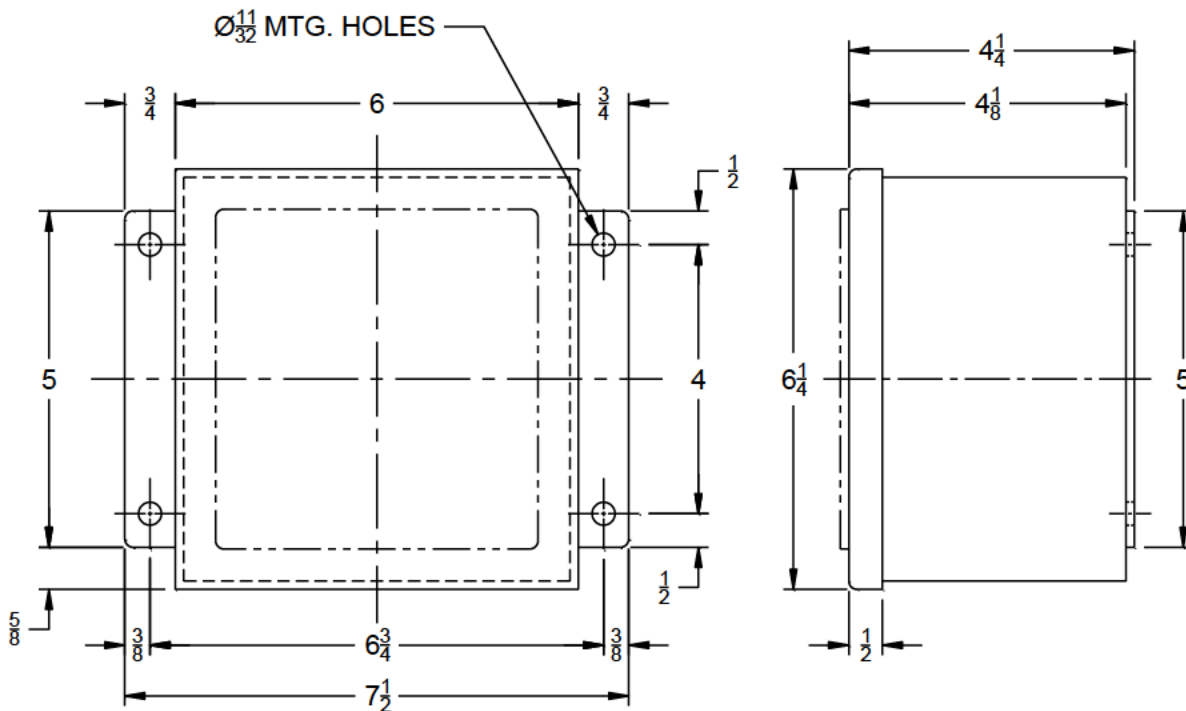


NOTES:

1. All dimensions in inches.
2. Tolerances $\pm\frac{1}{32}$.
3. Three brackets shall be provided on three sides of the wiper motor housing, except the side where the wiper protrudes.
4. Bracket mounting holes shall be according to manufacturer's mounting location but shall provide secure mounting against shock and vibration requirements.
5. The length of mounting bracket legs shall not exceed $4\frac{1}{2}$ inches but shall be long enough for the wiper arm shaft to move freely.

FIGURE 1. Wiper housing envelope dimensions.

MIL-DTL-3459E



NOTES:

1. All dimensions in inches.
2. Tolerances $\pm 1/32$.
3. Bracket mounting holes shall be according to manufacturer's mounting location but shall provide secure mounting against shock and vibration requirements.

FIGURE 2. Single control box mounting holes and envelope dimensions.

3.2.2 Vibration. The wiper system shall conform to the type I vibration requirements of MIL-STD-167-1 (see 4.6.1).

3.2.3 Shock. The wiper system shall conform to the grade B shock requirements of MIL-DTL-901 (see 4.6.2).

3.2.4 Airborne noise. The wiper assembly shall be constructed so that, when operating, the sound pressure level shall not equal or exceed 85 A-weighted decibels (dBA) (Limit A) in accordance with MIL-STD-1474 (see 4.6.3).

3.2.5 Electromagnetic interference (EMI) reduction. Each wiper unit shall meet full MIL-STD-461 requirements for class A4 equipment except as modified herein:

- a. RS-03 limits shall be 200 volts per meter in the frequency range of 2 to 30 megahertz (MHz).
- b. CS-02 testing shall apply to all power interconnecting, control, and signal cables that are unshielded or are to be installed with single point grounding. Between 2 to 30 MHz, the equipment shall be subjected to common mode coupling to 12.25 volts or 3 watts from a 50-ohm source.

MIL-DTL-3459E

3.3 Mechanical equipment. The design shall be such that the equipment can pass a 1,000-hour endurance test (see 4.6.6).

3.3.1 Wiper drive housing assembly. The wiper drive housing assembly (motor reduction gear and operating mechanism) shall be for mounting either on the inboard (interior) or outboard (exterior) side of a ship's deck house structure as specified (see 6.2). Inboard units, phenolic (see 3.2.1.1), shall be marked "for interior use only". The wiper motor, filter, angle drive, or other linkage mechanism shall be contained within the housing assembly. Outboard unit housing shall be weathertight with ventilation tubing. The cover of the housing assembly shall be removable and, when removed, shall expose all electrical and mechanical components. Electrical leads and components shall not be attached to the cover of the housing. For electrical connection to cable from the control box, a phenolic housing shall be provided with a metal insert threaded $\frac{3}{4}$ -inch nominal pipe size (nps); conversely, a metal housing shall have a threaded hole this size. In either case, the threaded hole shall be sealed with a removable protective plastic cap having a push-in or screw thread configuration.

3.3.2 Installation and mounting. Inboard mounted drive assemblies shall only require one penetration hole. The wiper output shaft containing the arm heater for attaching the blade assembly shall pass through a single hole 1.375 inches nominal in diameter. A metal stuffing tube assembly capable of being attached to the ship's structure by means of a locknut shall be provided. The stuffing tube shall be so packed and sealed to allow the drive arm to rotate smoothly yet not allow water to enter the ship's interior. Three mounting legs shall be provided and attached to the wiper drive housing assembly. The wiper housing shall be provided with means for mounting the housing assembly above or below designated windows.

3.3.3 Drive system. The output drive shaft through mechanical linkage shall rotate in alternate directions so that it will cause the drive arm to travel through a reciprocating angle stroke. Stroke angles shall range from a minimum of 41 degrees to a maximum of 0 degrees. A separate mechanical converter shall not be used for obtaining a reciprocating blade motion.

3.3.4 Drive arm assembly. A wiper drive arm shall be provided to transmit drive shaft motion to the wiper blade. The upper wiper arm shall contain an encased electrical heating element. Means shall be provided for attaching and removing the lower wiper arm assembly when required. When the wiper assembly (drive mechanism) is mounted inboard and the wiper drive arm assembly penetrates the ship's structure, means shall be provided for replacing the upper arm assembly without removing the wiper assembly from its mounting. An angled drive arm may be used to provide better visibility, less noise during operation, and shall not obstruct field of vision when the wiper arm and blade are parked.

3.3.4.1 Lower wiper arm assembly. Unless otherwise specified (see 6.2), a lower arm assembly constructed from material as specified in 3.2.1.1 shall be provided. Lower arm assembly will transmit motion of upper drive arm to blade assembly. The lower arm shall be supplied with an approximate overall length of 20 inches, including all hardware.

3.3.4.2 Blade action. The size and motion of the blade shall be able to wipe approximately 40 percent to 75 percent of the window glass. The wiper blade shall be held against the window by adjustable spring tension. Blade pressure shall be adjustable from 1 pound minimum to 3 pounds maximum. Means shall be provided to prevent the wiper blade and arm from interfering with the opening and closing of the window. When the window is opened, it shall be possible to extend wiper arms outward without mechanical damage.

3.3.4.2.1 Blade assembly. Each wiper shall be provided with one straight back blade assembly with an overall length of 12 inches. Unless otherwise specified (see 6.2), blades of other lengths, for example 6, 8, 10, 14, 16 inches, and so forth, shall be provided if required. The wiping edge of the blade shall be formed of a neoprene rubber material having inherent resistance to the salt-sea environment conditions as well as resistance to the effects of ultra-violet rays of the sun (see 3.5). The wiping edge of the blade shall not soften or stick to glass while under a maximum pressure of 8 pounds and surface temperature of glass is at 140 °F. Blade material shall be such that no scratching, abrasion, or other damage to the windshield surface will occur as a result of operation of the wiper system.

MIL-DTL-3459E

3.3.4.3 Clevis bracket. A clevis bracket shall be used to join the blade to the wiper arm. The clevis bracket shall rotate 360 degrees and lock at any angle selected. The clevis bracket shall not work loose during operation of the wiper due to the environmental conditions encountered. Use of a quick-clip for attaching the blade to the clevis bracket shall be avoided. The blade, when attached to the clevis bracket, shall have freedom of motion in a direction parallel to the bracket.

3.3.5 Stroke speed. The wiper shall operate between a “slow” speed of 140 and a high speed of 240 strokes per minute by means of a variable powerstat switch. This shall be applicable to all lengths of drive arms and blade sizes. A stroke will be considered as motion of the wiper blade across the area of sweep from one extreme position to the other.

3.3.6 Travel adjustments. A travel adjustment shall be provided for adjusting the angle of sweep from a minimum of 41 degrees to a maximum of 70 degrees. There shall be a minimum of 10 angular adjustment positions. Travel adjustment shall not require removing the installed wiper from the ship’s structure.

3.3.7 Centering of wiper blade arm. The wiper blade arm shall be centered or placed in a bias position in relationship to sweep configuration. The wiper drive housing assembly cover, when open, shall provide access to adjustment for centering the blade.

3.3.8 Glareproofing. Exposed parts shall be finished in such a manner as to eliminate reflection that could affect personnel.

3.3.9 Multi-wipers. Unless otherwise specified (see 6.2), two or more complete wiper drive assemblies may be installed on large size windows. A single wiper drive assembly may operate a remote or follower unit by means of a connecting rod. The remote or follower wiper unit shall confine itself to the window on which the drive unit is installed.

3.3.10 Bearings. Bearings shall be in accordance with A-A-59581 or A-A-59583. The configuration of the bearings shall be “double seal”. The tolerance class shall be ABEC-1.

3.3.11 Gears. Gear assemblies shall be properly aligned and meshed and shall be operable without interference, tight spots, loose spots, or other irregularities. Where required for accurate adjustments, gear assemblies shall be free from excessive backlash. Gears fitted on the shaft shall be secured thereto by means which will effectively prevent relative motion between the gear and shaft.

3.4 Electrical equipment. Electrical design, processes, safety, and fabrication shall be in accordance with MIL-DTL-917 except as specified in this specification. The design shall be such that the equipment can pass a 1,000-hour endurance test (see 4.6.6). In addition, the design of units for outboard installation shall be such that the equipment can pass a spray test (see 4.6.8) and salt water immersion test (see 4.6.9).

3.4.1 Motor. Motor shall be commercial grade and shall have the following characteristics:

- a. Rating: horsepower (hp).
- b. Voltage: 115 volts, direct current.
- c. Winding: permanent magnet.
- d. Speed classification: adjustable.
- e. Enclosure for inboard mounting: ventilated.
- f. Enclosure for outboard mounting: spray tight.
- g. Bearings: ball, sealed, and permanently lubricated.
- h. Electrical insulation: class B, F, or H in accordance with ANSI/NEMA MG 1.

NOTES:

1. A metal plate on the motor shall contain the above information and indicate the direction of rotation. The plate shall be installed on the motor where necessary for proper function of the equipment.
2. Filters for EMI shall be line-to-line type.

MIL-DTL-3459E

3.4.2 Drive unit. The drive unit for the wiper shall include a motor and drive mechanism that converts the rotary motion of the motor shaft into the back-and-forth motion necessary for wiper operation. Both the motor and the mechanism shall be housed in a dripproof protected enclosure. The enclosure shall have a drain fitting on the side for condensation drainage.

3.4.3 Controllers. The controller shall be electromechanical, magnetically operated, and non-programmable for direct control of equipment. The controller shall have no external ports, shall not be programmable, and shall not have remotely changeable operational characteristics. Changing operational characteristics shall require opening the controller enclosure and physically making the adjustment or modification. If required, supervisory status signals (i.e., start, stop, position, on, or off) shall be achieved via one-way non-IP communication paths only. No volatile or non-volatile memory shall be present. Wireless communication capabilities shall be disabled, and no wireless connections shall be present. Control equipment shall be in accordance with MIL-DTL-2212 (except an autotransformer may be used), and shall have the following characteristics:

- a. Enclosure: dripproof protected (shall be in accordance with MIL-DTL-2036).
- b. Rating: output 115 volts, direct current (VDC) and input 120 VAC, 60 hertz (Hz) (input power shall be in accordance with MIL-STD-1399-300-1).
- c. Operation: manual.
- d. Type: full voltage.
- e. Function: motor starting, speed regulation, and heating element control.
- f. Protection: overload.
- g. Service: C.
- h. Motor speed control range: see 3.3.5.
- i. Openings for electrical cable entrance: none, user to drill as required.
- j. Indicator light (two): heated arm energized.

3.4.4 Control equipment. Control equipment, by means of a variable transformer and a full wave bridge silicon rectifier in accordance with MIL-DTL-917, shall convert 115 VAC 60 Hz input power to approximately 115 VDC full wave power for motor operation. The DC supplied wiper drive motor shall have a form factor of 1.1 or less. The drive motor and controller box shall be grounded individually.

3.4.5 “ON” and “OFF” power switches. Each wiper shall be provided with a double pole toggle (control) switch. The wiper control switch shall be marked with positions “ON” and “OFF” and “PARK”. In the PARK position, the control switch shall be turned on and off momentarily to set the wiper blade in the desired position so as not to obstruct normal vision through the viewing area. The heater control switch shall be marked “ON” and “OFF”.

3.4.6 Protection. Overload and short circuit protection for the control equipment shall be as follows:

- a. Circuit breaker in heater circuits.
- b. The wiper motor shall be protected by an overload circuit breaker, the amperage rating of the circuit breaker to be approximately 10 percent over the running amperage rating of the motor sufficient to protect the motor from burn-out. Circuit breakers shall be single pole.
- c. The protection method used shall prevent the motor in a 120 °F ambient temperature from exceeding the values in [table I](#).

MIL-DTL-3459E

TABLE I. Maximum temperature rise by motor insulation class.

Motor insulation class	Maximum temperature rise (locked rotor) °F
B	230
F	280
H	325

3.4.7 Heater. The heater shall be watertight and controlled by a double pole toggle switch. The heater circuit shall operate on 115 VAC, 60 Hz single phase. The heater shall be contained within the “L” portion of the wiper drive arm assembly. With the wiper in static position, a temperature reading taken at the outside metal casing shall be between 300 and 350 °F at an ambient temperature of 72 °F. Slip-rings shall not be used to supply electrical power to the reciprocating arm heater. A heater indicator light shall show when the heater is in operation. The light shall be mounted near the corresponding heater power switch. The light shall be illuminated when the heated arm is energized. The lens color shall be red, and the lamp and lampholder shall have a built-in resistor and shall conform to the requirements of MIL-DTL-3661, MIL-L-3661/8, and MIL-L-3661/14.

3.4.7.1 Wiper arm pivot heaters. The wiper arm pivot for multi-blade type wipers shall be provided with a strip heater approximately 55 to 75 watts at 115 VAC to prevent ice accumulation. Pivot heaters shall be provided on a hinged bracket with a shielded (metal encased) cable lead approximately 3 feet in length. Users will provide a bulkhead gland for cable entrance and a mounting pad to fasten the pivot heater to the ship’s structure adjacent to the area to be heated. Interior mounted wiper drive assemblies which have an exterior pivot heater shall be constructed so as not to interfere with the wiper blade. When the window is opened, it shall be possible for arms to extend outward without mechanical damage. Heaters installed as one unit shall be connected to one heater switch in the wiper control box. Total heater currents shall be used in calculating circuit protection for that system.

3.4.8 Wiring. Permanent internal wiring shall be copper. The size, stranding insulation, and spacing shall be mechanically and electrically suited to the applications. Wires exposed to heat shall be insulated with 221 °F (105 °C) thermo-plastics and outer braid. The minimum wire size shall be AWG #18.

3.4.9 Terminating electrical wires. Connections in the wiper drive assembly and control box shall be soldered, except those terminating at terminal blocks. Wires at terminal blocks shall be terminated with preinsulated compression (crimps) type connectors in accordance with SAE AS7928, type II, and shall firmly and completely grip the conductor and the wire insulation.

3.4.10 Wiring diagram and markings.

3.4.10.1 Control box. Terminal board connections shall be identified as follows:

Terminal point:

#1 Black (-)	-	to wiper motor
#2 Red (+)	-	to wiper motor
#3 Heater circuit	-	arm heater
#4 To ship’s supply	-	115 VAC, 60 Hz
#5 To ship’s supply	-	115 VAC, 60 Hz
#6 Heater circuit	-	arm heater

MIL-DTL-3459E

3.4.10.2 Wiper assembly. Terminal board connections shall be identified as follows:

Terminal point:

#1	Black (-)	-	wiper motor
#2	Red or white (+)	-	wiper motor
#3	Heater circuit	-	arm heater
#4	Heater circuit	-	arm heater

The wiper assembly shall contain a wiring diagram in the control box. Switches, controls, and components shall be properly marked, identified, and functions indicated. Examples: "SPEED LO-HI" increasing in a clockwise direction, also "HEATER" switch "OFF" and "ON" with a note clearly stating "UNDER ICING CONDITIONS, CLOSE HEATER SWITCH 15 MINUTES BEFORE OPERATING WIPER."

3.5 Performance. Each wiper shall be able to operate without scratching the glass. Each wiper shall withstand the performance tests specified in 4.3 and shall operate under the following conditions:

- a. Relative humidity to 100 percent, including conditions wherein condensation takes place in the form of both water and frost.
- b. Winds up to 40 knots and ice accumulation rate of 6 inches per hour when installed on an electrically heated window.
- c. Exposure to salt-sea atmosphere as specified in method 509.2 of MIL-STD-810.

3.6 Identification plates. The identification plate shall be as specified in MIL-DTL-15024 and MIL-P-15024/5 and contain the following information:

- a. Electric window wiper.
- b. Manufacturer's name and address.
- c. Manufacturer's type or drawing number.
- d. Serial number.
- e. National stock number, when specified (see 6.2).
- f. Year of manufacture.
- g. Contract or order number.
- h. Technical manual number.
- i. Allowance parts list (APL) number to be furnished by the contracting activity.
- j. Component identification (CID) number, if available (see 6.2).

4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. First article inspection shall be performed on a window wiper system when a first article sample is required (see 3.1). This inspection shall include the examinations of 4.5 and the tests of 4.6.

MIL-DTL-3459E

4.3 Conformance inspection. Conformance inspection shall include the examinations of 4.5 and the tests indicated in [table II](#).

TABLE II. First article and conformance inspections and testing.

Procedure	Requirement	Verification	First Article	Conformance
Visual examination	3.2.1.1, 3.2.1.2, 3.2.1.3, 3.2.1.4, 3.2.1.5, 3.2.1.6, 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.4.1, 3.3.4.2, 3.3.4.2.1, 3.3.4.3, 3.3.7, 3.3.8, 3.3.9, 3.3.10, 3.3.11, 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.6, 3.4.8, 3.4.9, 3.4.7.1, 3.4.10.1, 3.4.10.2, 3.6	4.5	X	X
Vibration	3.2.2	4.6.1	X	
Shock	3.2.3	4.6.2	X	
Airborne noise	3.2.4	4.6.3	X	
EMI emission and susceptibility	3.2.5	4.6.4	X	
Stroke speed	3.3.5	4.6.5.1	X	
Travel adjustment	3.3.6	4.6.5.1	X	
Low temperature	3.2.1	4.6.5.2	X	X
Endurance	3.3	4.6.6	X	
Parking operation	3.4.5	4.6.7	X	
Water spray	3.4	4.6.8	X	X
Salt water immersion	3.4	4.6.9	X	X
Dry glass	3.5	4.6.10	X	
Heated arm	3.4.7	4.6.11	X	

4.4 Sampling.

4.4.1 Lot. For the purpose of sampling, a lot shall consist of all electric window wipers offered to the Government.

4.4.2 Sampling for examination. A random sample of electric window wipers shall be selected from each lot offered to the Government in accordance with ANSI/ASQ Z1.4 at inspection level II and the Acceptance Quality Limit (AQL) specified (see 6.2).

4.4.3 Sampling for tests. One electric window wiper of each size shall be selected.

4.5 Visual examination. Each sample item (see 4.4.2) shall be visually examined to determine conformance with the requirements specified as being verified by 4.5 in [table II](#).

MIL-DTL-3459E

4.6 Test methods.

4.6.1 Vibration. The wiper system shall be tested in accordance with MIL-STD-167-1, type I vibration (see 3.2.2). Note: The type I vibration tests 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 vibratory displacement values noted in the amplitudes table of MIL-STD-167-1. The total resonant frequency endurance test time shall be at least 2 hours. Thus, if a total of 12 resonant frequencies, as defined herein, are noted for the three test orientations, each of the 12 frequencies shall be endurance tested for at least 10 minutes.

4.6.2 Shock. The wiper system shall be shock tested in accordance with MIL-DTL-901, grade B (see 3.2.3). After completion of the test, the system shall be examined to determine that it conforms to grade B requirements.

4.6.3 Airborne noise. The wiper system shall be operated between a slow speed and a high speed (see 3.3.5) alternately to determine compliance with 3.2.4, while wetted down and dry for 15-minute periods as applicable. Sound measurement data shall be recorded before, during, and at the finish of each operating period. Failure to conform to the requirements of 3.2.4 shall constitute failure of the test.

4.6.4 EMI emission and susceptibility. EMI emission and susceptibility tests shall be in accordance with MIL-STD-461. Performance shall be in compliance with the requirements of 3.2.5.

4.6.5 Functional tests.

4.6.5.1 Speed. The wiper system shall be tested for stroke speed (see 3.3.5) and travel adjustment (see 3.3.6). There shall be no visible indication of lubricant leaks.

4.6.5.2 Low temperature. The wiper system shall be operated in a cold room maintained at a temperature of 20 °F (see 3.2.1) using a neoprene rubber wiper blade. An electrically heated window in accordance with MIL-W-18445 shall be used in connection with this test. The electrically heated window and wiper arm pivot heater shall be turned on approximately 15 minutes before the test and shall remain on for the duration of the test. A spray of fresh water shall be sprayed on the glass and the wiper operated for 30 minutes to determine its effectiveness in cold weather for removing rain and spray. The wiper arm and pivot joint heater shall be examined for freedom from ice formation. Malfunction or ice formation shall be cause for rejection.

4.6.6 Endurance. The wiper system shall be operated at room temperature ranging from 70 to 85 °F at a speed of 200 strokes per minute for a period of 1,000 hours (see 3.3 and 3.4). The total length of arm from center of clevis bracket to center of wiper arm assembly shall be approximately 20 inches in length. A neoprene rubber wiper blade 16 inches long shall be attached to the arm. The sweep angle shall be adjusted for a 60- to 70-degree sweep. A spray of 4 percent salt water solution (5.28 ounces of sodium chloride per gallon of water) shall be sprayed on the wiper and the glass throughout the test. The wiper shall maintain its speed throughout the test. No parts shall loosen or become detached. There shall be no visible signs of corrosion on any part.

4.6.7 Parking operation. Following the endurance test (see 4.6.6), the wiper system shall be tested for parking operation (see 3.4.5). This shall consist of a minimum of 100 cycles of parking operation at 5-second intervals. One cycle shall consist of operating the control from "OFF" to "PARK" and back to "OFF". If automatic park is available, one cycle shall consist of turning the control from "ON" to "OFF" (auto-park position) and back to "ON". The blade may be parked to the right or left side alternately. Any malfunction during the test shall constitute a failure.

4.6.8 Water spray. This test is only applicable for units designed for outboard installation. The wiper drive housing assembly shall be mounted in a horizontal position (similar to usual installation position). With power applied and the wiper operating, at least 65 gallons per minute (gal/min) of fresh water from a 1-inch nozzle shall be sprayed on the wiper drive housing at a distance not less than 10 feet for 5 minutes. The wiper shall maintain its speed throughout the test (see 3.4).

MIL-DTL-3459E

4.6.9 Salt water immersion. This test is only applicable for units designed for outboard installation. The wiper drive housing assembly shall be totally immersed in a tank of 4 percent salt solution at an approximate temperature of 70 °F for a period of 5 minutes. After the immersion test, the wiper shall be operated at 200 strokes per minute. Following successful operation, the housing assembly shall be opened and examined for the presence of water. The amount of water in the housing shall not exceed 0.3 cubic inches (in³) (see 3.4).

4.6.10 Dry glass. The wiper shall be operated on a dry window glass for 15 minutes or until the circuit breaker is activated to protect the motor at a speed of 200 strokes per minute without damage to the wiper. At the end of the test, the wiper mechanism shall be disassembled and examined for wear and condition of lubrication. During the above test, the wiper blade may leave a minimal deposit of rubber on the glass surface. The wiper blade shall not scratch the glass (see 3.5).

4.6.11 Heated arm. The drive arm assembly containing an encased electrical heating element shall be tested. While the arm is clamped to a test fixture, 115 VAC, 60 Hz power shall be applied to the heating element for a period of approximately 15 minutes. After this period of time, a temperature indicating device shall be used to measure the temperature of the heated arm. The temperature shall comply with the requirements specified in 3.4.7. While the arm is hot and power is removed, the arm, except leads, shall be immersed in a tank of fresh water for a period of 10 minutes. After this period of time, a megger reading (insulation reading using a 500-volt instrument) shall be taken between each lead and metal case. Readings shall be 5 mega ohms or greater.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. Wiper systems covered by this specification are intended to be used for clearing exterior surfaces of windows and windshields on ship's bridge, signal shelter, and other areas in ordinary and freezing weather conditions. Wiper systems covered by this specification are required to meet the shock, vibration, and endurance requirements standard for military vessels. Current stock of wiper systems may be used until depleted; future requisitions for wiper systems should refer to the current version of this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Classification of wiper system required (see 1.2).
- c. When first article inspection is required (see 3.1).
- d. Blade orientation (see 3.2.1).
- e. Mounting of wiper drive housing assembly either inboard or outboard (see 3.3.1).
- f. Lower arm assembly material construction if other than specified (see 3.3.4.1).
- g. Blade size required if other than 12 inches in length (see 3.3.4.2.1).
- h. Single or multi blade (see 3.3.9).
- i. National stock number, if required (see 3.6).
- j. Component identification number (see 3.6).

MIL-DTL-3459E

- k. AQL of 1.0 (see 4.4.2).
- l. Packaging requirements (see 5.1).
- m. Requirements for Provisioning Technical Documentation (PTD), spare parts, and repair parts (see 6.4).

6.3 First article. The Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Provisioning. PTD, spare parts, and repair parts should be furnished as specified (see 6.2). 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 verifications as the parts used in the manufacture of the equipment. Packaging for such parts should also be specified.

6.5 Sub-contracted materials and parts. The packaging 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.

6.6 Subject term (key word) listing.

Blade

Heaters, arm pivot

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

CONCLUDING MATERIAL

Custodians:

Army – CR4

Navy – SH

Preparing activity:

Navy – SH

(Project 2090-2018-001)

Review activity:

Navy – CG

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.