

INCH-POUND
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SUPERSEDING
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PERFORMANCE SPECIFICATION

WATCH, WRIST: GENERAL PURPOSE

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

1. SCOPE

1.1 Scope. This specification covers analog wrist watches intended for general use, that are intended to be continuously read, without any action required on the part of the wearer, for periods in excess of 8 hours in low or no light situations.

1.2 Classification. The watches are of the following types, classes, and colors, as specified (see 6.2).

1.2.1 Types. The types of wrist watches follow:

Type I - Analog, short life (2 years), non-maintainable, antimagnetic, water-resistant

Type II - Analog, long life (5-10 years), maintainable, antimagnetic, water-resistant, high altitude, corrosion-resistant

Type III - Analog, long life (5-10 years), maintainable, antimagnetic, water-resistant, high altitude, corrosion-resistant, with elapsed time ring

1.2.2 Classes. The classes of wrist watches follow:

Class 1 - Electrical movement, battery installed

Class 2 - Electrical movement, battery out of watch but packed with watch

Class 3 - Electrical movement, battery not included with watch

Class 4 - Mechanical movement, battery not required

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: Defense Supply Center Richmond (DSCR), ATTN: DSCR-VBD, 8000 Jefferson Davis Highway, Richmond, VA 23297-5610 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

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1.2.3 Colors.

Color M - Silvery metallic

Color B - Black

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 documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Standard. The following standard forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplemented thereto, cited in the solicitation (see 6.2).

STANDARD

DEPARTMENT OF DEFENSE

MIL-STD-810E - Environmental Test Methods and Engineering Guidelines

(Unless otherwise indicated, copies of the above standard are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. The watches furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list (QPL) before contract award (see 4.3 and 6.3).

3.2 Toxic chemicals, hazardous substances, and ozone depleting substances (ODS). The use of toxic chemicals, hazardous substances, or ODS shall be avoided, whenever feasible.

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3.2.1 Toxicity. The finished product covered by this specification shall have no adverse effect on the health of personnel when used for its intended purpose.

3.3 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable 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.

3.4 Design. There shall be a stem set movement driving concentrically mounted hour, minute, and second hands around a 12 hour dial. The dial background shall be black; the numbers and graduations shall be white. Arabic numerals 1 through 12 shall be adjacent to and inside the hour marks and arranged in a clockwise direction. Concentric with and adjacent to the numerals 1 through 12, in a smaller font, shall be the Arabic numerals 13 through 24. The 13 shall be adjacent to the 1 o'clock; the 14 shall be adjacent to the 2 o'clock; and continuing until the 24 is adjacent to the 12 o'clock. Manufacturer symbols or identification shall not appear on the dial.

3.4.1. Design approval. At the time of qualification testing, movement and case design shall be reviewed by and subject to the approval of the government. Manufacturer drawings, specifications, sample movements, sample cases, and supporting data, as applicable, shall be submitted for government approval in accordance with 4.6.5.1.

3.4.2 Movement.

3.4.2.1 Class 4 (mechanical).

3.4.2.1.1 Mechanical power. The movement shall be powered by a stem wound and stem set mainspring. When fully wound, the mainspring shall drive the complete movement a minimum of 36 hours without rewinding.

3.4.2.1.2 Jewel bearings, types II and III. The movement shall have 15 or more functional jewel bearings located at bearing points most essential to reduce friction and wear of the train and escapement parts.

3.4.2.2 Classes 1, 2 and 3 (electrical). Classes 1, 2 and 3 watches shall be powered by a self-contained electrical power cell. For type I classes 2 and 3, types II and III classes 1, 2 and 3 watches, the power cell shall be commercially available from a minimum of two manufacturers and shall contain orientation marks which identify the positive (+) side. Internal contacts for the power cell shall be made of, or plated with, material that shall not corrode. The electrically powered watch shall operate a minimum of 2 1/2 years without the necessity to change the battery.

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3.4.3 Hand adjustment.

3.4.3.1 Hand setting. The minute hand shall not rotate (jump) at its tip, more than one tip width when the crown is moved from the setting position to the “winding” position after setting the hands.

3.4.3.2 Second hand stop mechanism. Pulling the stem, by means of the crown, to the setting position shall result in stopping the movement. Rotation of the stem, by turning the crown, shall permit the minute and hour hands to be advanced without any movement of the second hand. Depressing the stem, by pushing the crown, shall result in complete operation of the movement and hands. When the stem is pushed in, the watch shall start immediately.

3.4.4 Elapsed time ring, type III. There shall be an elapsed time ring concentric with the axis of the watch. The elapsed time ring shall be designed to assure that the outer edge (shoulder) of the crystal is recessed within the elapsed time ring. The background of the elapsed time ring shall be the same shade of black as the background of the dial. The numbers and graduations shall be the same shade of white as that on the dial. Around the ring there shall be 12 hour marks equally spaced around the dial. Except for the number 12, all the marks shall be numerals starting with 1 and progressing clockwise to 11. The number 12 shall be replaced by a luminous mark. Between the 12 o'clock and 1 o'clock, 1 o'clock and 2 o'clock, 2 o'clock and 3 o'clock, and the 3 o'clock and 4 o'clock marks, there shall be four equally spaced minute marks. The periphery of the elapsed time ring shall be made rough by checkering, knurling, serrating or any method that shall facilitate the turning of the ring. The elapsed time ring shall move only when a torque of 180 ± 40 mNm (26 ± 6 inch-ounces) is applied both in the clockwise and counterclockwise directions. The elapsed time ring shall be capable of withstanding, without damage, two forces, each of 44.5 ± 2 N ($10 \pm 1/2$ pounds), applied to the lower side of the elapsed time ring with the 12 o'clock luminous mark at the 3 o'clock position.

3.4.5 Case bars, types II and III. A watch strap shall be attached to the watch case at both ends by means of integral bars or removable spring bars. A static pull of 67 ± 2 N ($15 \pm 1/2$ pounds) on the watch strap from each end of the case shall cause no damage.

3.4.6 Crystal strength. Crystals, that have been assembled to the case and that have been subjected to the storage environment of table I, shall be visually inspected and tested for strength. When visually inspected, the crystals shall be transparent, uncolored, and free from bubbles, striae, scratches, chips or other imperfections that may interfere with reading the watch. When functionally tested, the crystal shall show no visible damage of cracking or chipping.

3.4.7 Strap. The strap color shall be black.

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TABLE I. Operating environment.

Environment	Limits	Duration
Simple harmonic vibration	Amplitude of 0.762 ± 0.127 mm (1.524 ± 0.254 mm total excursion)	20 minutes with vibration perpendicular to dial
	Amplitude of 0.030 ± 0.005 inch (0.060 ± 0.010 inches total excursion)	20 minutes with vibration in plane of dial and in direction from 12 to 6
	Frequencies varied uniformly between 30 Hz to 60 Hz to 30 Hz	20 minutes with vibration in plane of dial and in direction from 9 to 3
Shock	Drop from height of 50 cm (19.7 inches), uncontrolled, onto vinyl tile 3 mm (1/8 inch) thick affixed to concrete block	Once
Storage	$-45\text{ }^{\circ}\text{C} \pm 1.1\text{ }^{\circ}\text{C}$ ($-50\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$)	24 hours
	$15.5\text{ }^{\circ}\text{C}$ to $32.2\text{ }^{\circ}\text{C}$ ($60\text{ }^{\circ}\text{F}$ to $90\text{ }^{\circ}\text{F}$)	24 hours
	$60\text{ }^{\circ}\text{C} \pm 1.1\text{ }^{\circ}\text{C}$ ($140\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$) and ≥ 50 percent relative humidity	24 hours
	$15.5\text{ }^{\circ}\text{C}$ to $32.2\text{ }^{\circ}\text{C}$ ($60\text{ }^{\circ}\text{F}$ to $90\text{ }^{\circ}\text{F}$)	24 hours
Water resistance	Complete immersion in distilled water with approximately 1 percent by weight wetting solution under one atmosphere (14.7 psi) and at room temperature	5 minutes
	Complete immersion in distilled water with approximately 1 percent by weight wetting solution under three atmospheres (44.1 psi) and at room temperature	5 minutes
Water leakage	Submerged in a measured volume of distilled or deionized water, equal to approximately 10 times the volume of the watch, at $23\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ($73\text{ }^{\circ}\text{F} \pm 3\text{ }^{\circ}\text{F}$)	24 hours
Magnetism, type I	14.5 to 15.5 Gauss magnetic field, stem parallel to direction of field	10 cycles of 3 seconds on - 3 seconds off
Magnetism, types II and III	125 ± 1 Gauss magnetic field, stem parallel to direction of field	10 minutes

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TABLE I. Operating environment. - Continued

Environment	Limits	Duration
Altitude, types II and III	Altitude of 10,700 meters (35,000 feet)	60 minutes
Salt fog, types II and III	Salt fog test Method 509.3, MIL-STD-810	48 hours
Human perspiration resistance, types II and III	Immerse watch in a saturated sodium chloride solution containing 5 percent by volume lactic acid (65 strength) at 91 °C ± 1 °C (196 °F ± 2 °F)	Instantaneous
	Air dry	2 hours
	Store in atmosphere produced by a 50 percent solution of glacial acetic acid	20 hours
Readability in total darkness	After having been stored in total darkness for 8 hours, and without any intervention on the part of the user, watch shall be readable in total darkness	8 hours

3.4.8 Case markings. The back of the case shall be marked with the information shown in table II.

TABLE II. Case markings.

Item	Descriptive title
Title and specification number	WATCH, WRIST: GENERAL PURPOSE, MIL-PRF-46374G
National stock number	NSN
Amount of radioactive material	MILLICURIES
Nuclear Regulatory Commission manufacturer identification number	NRC MFR ID NO.
Contract number	CONT NO.
Date	DATE
Serial number	SERIAL NO.
Manufacturer CAGE code	MFR CAGE CODE

Note: The national stock number, contract number, and date may be applied without the descriptive titles. The amount of radioactive material and the Nuclear Regulatory Commission manufacturer identification number are necessary only if there is radioactive material present. The marking of the month shall be the first three letters of the month and the marking of the year shall be the year in full, e.g. April 2009 would be "APR 2009". For type I class 3, types II and III class 3, and all class 4 watches, the date (month and year) shall be date of award of contract. For all other watches, the date (month and year) shall be date of assembly. Only type I class 3 and all class 4 watches shall be serialized. The serial numbers shall be assigned by the contractor. Serial

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numbers of rejected watches shall not be repeated. For class 3 and 4 watches, the manufacturer's name and model or grade number shall be marked on the movement (barrel bridge, train bridge or both).

3.4.9 Case.

3.4.9.1 Battery servicing. For type I classes 2 and 3 and types II and III classes 1, 2, and 3 watches, the power cell shall be replaceable without damaging the watch such that it would not be able to meet all the performance characteristics of 3.5.

3.4.9.2 Finish and color. All visible exterior surfaces of the case assembly, excluding control switches and spring type case bars, shall have a dull non-specular/non-reflective finish. The color shall be silvery metallic or black as specified in the acquisition requirements (see 6.2).

3.5 Performance characteristics.

3.5.1 Vibration. While running, the watch shall not be damaged after being subjected to the vibration environment of table I.

3.5.2 Shock. While running, the watch shall not be damaged after being subjected to the shock environment of table I.

3.5.3 Storage. For class 1 watches, while running, the watch shall not be damaged after being subjected to the storage environment of table I. For class 2 watches, both the watch and its battery (battery not installed) shall be simultaneously subjected to the storage environment of table I. For class 2 watches, at the conclusion of the storage test, the battery shall be installed in the watch and the watch shall run without any evidence of damage. For class 3 watches, the watch shall not be damaged after being subjected to the storage environment of table I. Class 4 watches shall not be run during test.

3.5.4 Water resistance. The watch shall show no evidence of leakage after being subjected to the water resistance environment of table I.

3.5.5 Water leakage. While running, the watch shall not be damaged after being subjected to the water leakage environment of table I. After the watches are removed from the water, if there is any water in the crystal bowl at the completion of the test, it shall constitute a failure of the water resistance test. (This test may be done concurrently with the radiological diffusion test in 3.6.3.)

3.5.6 Synchronization. The hour hand shall indicate the correct time within ± 1 dial graduation when the minute hand is at 12. To determine compliance, the setting mechanism shall be activated and readings taken when the minute hand is at 12 and the hour hand is at the 3, 6, 9 and 12 hour positions respectively.

3.5.7 Magnetism. While running, the watch shall not be damaged after being subjected to the magnetic environment of table I.

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3.5.8 Dark viewing. After being subjected to the readability in total darkness environment of table I, and without any intervention on the part of the observer, the luminous features of the watch shall be of sufficient brightness so as to be readable in total darkness while holding the watch no closer than 30.5 cm (12 inches) from the eyes of a dark-adapted observer having normal or corrected 20/20 vision.

3.5.9 Isochronism. Watches shall pass the test for isochronism specified in 4.6.5.16, in a dial-up position at $23.9\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ($75\text{ }^{\circ}\text{F} \pm 3\text{ }^{\circ}\text{F}$).

3.5.9.1 Type I class 4. The watch shall be fully wound and operated for 4 hours. The watch shall again be fully wound. The rate shall be recorded while fully wound and then at the end of the 4th, 20th and 24th hours. The difference in uniformity of rates between 4-hour periods shall not exceed 10 seconds.

3.5.9.2 Types II and III class 4. The variation in rate shall be recorded every 6 hours for a period of 24 hours and shall not exceed 5 seconds from the rate recorded in the previous 6 hour period. The watches shall be fully wound prior to testing and shall not be wound during the test.

3.5.10 Accuracy. After being subjected to all of the environments of table I, the mean daily rates of the watch in each of the two positions of (1) dial-up and (2) crown-down shall not exceed the values at the temperatures specified in table III.

TABLE III. Accuracy.

Temperature	Type I, Class 4	Types II and III, Class 4	Types I, II and III, Classes 1, 2, and 3
	Mean daily rate (Seconds per day)	Mean daily rate (Seconds per day)	Mean daily rate (Seconds per day)
$4.4\text{ }^{\circ}\text{C} \pm 1.1\text{ }^{\circ}\text{C}$ ($40\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$)	± 120	± 60	± 3
$23.9\text{ }^{\circ}\text{C} \pm 1.1\text{ }^{\circ}\text{C}$ ($75\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$)	± 60	± 30	± 0.7
$51.7\text{ }^{\circ}\text{C} \pm 1.1\text{ }^{\circ}\text{C}$ ($125\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$)	± 120	± 60	± 3

3.5.11 Long term accuracy (Qualification only). Accuracy shall be determined during a 90 day period as specified in 4.6.5.24. During the 90 day period of operation, watches shall be subjected to vibration and shock after 30 days and 60 days of operation in accordance with 3.5.1 and 3.5.2, except that duration of vibration shall be for only 5 minutes in each direction. Watches shall meet the criteria of table IV.

3.5.12 Altitude. Types II and III watches shall show no evidence of damage or adverse effect on operation when subjected to the altitude environment of table I.

3.5.13 Salt fog. Types II and III watches shall show no evidence of damage to the crystal, the case, or the watch band or adverse effect upon operation after having been subjected to salt atmosphere in accordance with the salt fog environment of table I.

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TABLE IV. Long term accuracy.

Type	Average mean daily rate (Seconds per day)	Mean daily rate (Seconds per day)
Type I, class 4	72	120
Types II and III, class 4	36	60
Types I, II and III, classes 1, 2, and 3	2.4	4

3.5.14 Human perspiration resistance. Types II and III watches and their watch bands shall show no evidence of corrosion, discoloration, or staining after having been subjected to an accelerated lactic acid test in accordance with the human perspiration environment of table I.

3.6 Radiological performance. (NOTE: Section 3.6 is applicable only if nuclear material is present.)

3.6.1 Contamination. Completed watches shall be tested for contamination after having been subjected to all the environments of table I. They shall be wiped with a Metrical GN-6 or equivalent wipe, moistened with deionized or distilled water. Within 1 minute of wiping, the wipe shall be placed in a scintillation counter. Each resulting wipe shall indicate a removable contamination level of not more than 100 disintegrations per minute (dpm).

3.6.2 Long term contamination (Qualification only). Completed watches shall be packaged in accordance with 5.1 for a period of not less than 90 days. They shall then be wiped with a Metrical GN-6 or equivalent wipe moistened with deionized or distilled water. Within 1 minute of wiping, the wipe shall be placed in a scintillation counter and the disintegrations measured. Each resulting wipe shall indicate a removable contamination level of not more than 100 dpm.

3.6.3 Diffusion. Completed watches shall be submerged in a measured volume of distilled or deionized water, equal to approximately 10 times the volume of the watch, for 24 hours at $23\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ($73\text{ }^{\circ}\text{F} \pm 3\text{ }^{\circ}\text{F}$). The watches shall then be removed from the water and the water measured for radioactive content. The diffusion of contamination into the water shall not exceed 50 nanocuries per 24 hour period (see 3.5.5).

3.7 Workmanship. All parts shall be furnished so the case and crown shall have no sharp edges or corners which could cause skin cuts or abrasions. All lugs from the tip of the lug to the body of the bezel shall have corners rounded to avoid skin abrasion. Rounded edges and corners shall be uniform in appearance.

3.8 Operating instructions. An operating instruction shall be furnished with each watch. This instruction shall describe all the functions of the watch, the durability (i.e., shock and water resistance features), life expectancy, and accuracy that can be expected from the watch, type battery and any precautions that should be observed during the life of the watch.

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4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as qualification inspection (see 4.3) and conformance inspection (see 4.4).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed at 15.6 °C (60 °F) to 32.2 °C (90 °F), at barometric pressure of 710 mm (28 inches) to 790 mm (31 inches) of mercury and maximum relative humidity of 80 percent.

4.3 Qualification inspection. Qualification inspection shall be performed on five complete assemblies when a qualification sample is required (see 3.1). This inspection shall include the examination of 4.5, in accordance with tables V through IX, and the tests of 4.6. (The table IX tests, however, are exclusive to Qualification testing.)

4.3.1 Qualification sample. A quantity of 20 watches shall be submitted for qualification testing (see 6.3). Testing shall be performed at a laboratory facility acceptable to the government. Sample watches submitted for testing shall be derived from normal production and be indicative of normal production equipment and procedures. Ten of the watches shall be packed in accordance with the level of packing specified in the purchase order or contract. The 20 watch samples shall be identified by an attached tag containing the following information:

- a. Sample for qualification tests
- b. Submitted by (name) (date) for qualification tests in accordance with requirements of MIL-PRF-46374G under authorization of (reference letter authorizing test)
- c. Manufacturer's model or part number
- d. Name of manufacturer

4.4 Conformance inspection. Conformance inspection shall be performed in accordance with inspection provisions set forth herein. The characteristics shown in tables V, VI, VII and VIII shall constitute minimum inspections to be performed by the supplier prior to government acceptance or rejection by item or lot.

4.5 Examination.

4.5.1 Conformance inspection, mechanical. Inspection shall be in accordance with table V.

TABLE V. Conformance inspection, mechanical.

Characteristic	Requirement	Test
Crystal strength	3.4.6	4.6.1.1
Strap	3.4.7	4.6.2
Battery servicing	3.4.9.1	4.6.3.1
Finish and color	3.4.9.2	4.6.3.2

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4.5.2 Conformance inspection, radiological. Inspection, if applicable, shall be in accordance with table VI.

TABLE VI. Conformance inspection, radiological.

Characteristic	Requirement	Test
Contamination	3.6.1	4.6.4.1
Diffusion	3.6.3	4.6.4.2

4.5.3 Conformance inspection, materials and design. Inspection shall be in accordance with table VII.

TABLE VII. Conformance inspection, materials and design.

Characteristic	Requirement				Test
	Type I		Types II and III		
	Classes 1, 2, 3	Class 4	Classes 1, 2, 3	Class 4	
Design	3.4	3.4	3.4	3.4	4.6.5
Design approval	3.4.1	3.4.1	3.4.1	3.4.1	4.6.5.1
Mechanical power	---	3.4.2.1.1	---	3.4.2.1.1	4.6.5.2
Jewel bearings	---	---	---	3.4.2.1.2	4.6.5.3
Electrical power	3.4.2.2	---	3.4.2.2	---	4.6.5.4
Hand adjustment	3.4.3	3.4.3	3.4.3	3.4.3	4.6.5.5
Hand setting	3.4.3.1	3.4.3.1	3.4.3.1	3.4.3.1	4.6.5.5.1
Second hand stop mechanism	3.4.3.2	3.4.3.2	3.4.3.2	3.4.3.2	4.6.5.5.2
Elapsed time ring (Type III only)	---	---	3.4.4	3.4.4	4.6.5.6
Case bars	---	---	3.4.5	3.4.5	4.6.5.7
Case markings	3.4.8	3.4.8	3.4.8	3.4.8	4.6.5.8

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4.5.4 Conformance inspection, performance. Inspection shall be in accordance with table VIII.

TABLE VIII. Conformance inspection, performance.

Characteristic	Requirement				Test
	Type I		Types II and III		
	Classes 1, 2, 3	Class 4	Classes 1, 2, 3	Class 4	
Vibration	3.5.1	3.5.1	3.5.1	3.5.1	4.6.5.9
Shock	3.5.2	3.5.2	3.5.2	3.5.2	4.6.5.10
Storage	3.5.3	3.5.3	3.5.3	3.5.3	4.6.5.11
Water resistance	3.5.4	3.5.4	3.5.4	3.5.4	4.6.5.12
Water leakage	3.5.5	3.5.5	3.5.5	3.5.5	4.6.4.2
Synchronization	3.5.6	3.5.6	3.5.6	3.5.6	4.6.5.13
Magnetism	3.5.7	3.5.7	---	---	4.6.5.14.1
Magnetism	---	---	3.5.7	3.5.7	4.6.5.14.2
Dark viewing	3.5.8	3.5.8	3.5.8	3.5.8	4.6.5.15
Isochronism	---	3.5.9.1	---	---	4.6.5.16.1
Isochronism	---	---	---	3.5.9.2	4.6.5.16.2
Accuracy	3.5.10	3.5.10	3.5.10	3.5.10	4.6.5.17
Altitude	---	---	3.5.12	3.5.12	4.6.5.18
Salt fog	---	---	3.5.13	3.5.13	4.6.5.19
Human perspiration resistance	---	---	3.5.14	3.5.14	4.6.5.20
Workmanship	3.7	3.7	3.7	3.7	4.6.5.21
Operating instructions	3.8	3.8	3.8	3.8	4.6.5.22

4.5.5 Qualification inspection. Inspection shall be in accordance with table IX.

TABLE IX. Qualification inspection.

Characteristic	Requirement - Types I, II and III	Test
Long term contamination	3.6.2	4.6.5.23
Long term accuracy	3.5.11	4.6.5.24

4.5.6 Noncompliance. If a sample fails to pass table VI inspection, the contractor shall immediately notify the cognizant Contracting Activity of such failure and take corrective action on the materials or processes, or both, and on all units produced which can be corrected and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the Contracting Activity, has been taken. After the corrective action has been taken, table VIII inspections may be reinstated; however, final acceptance and shipment shall be withheld until the table VI inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection and qualifying activities.

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4.6 Test methods.

4.6.1 Crystals. Crystals shall be examined after assembly to the case and after being subjected to the storage environment of table I to determine compliance with 3.4.6.

4.6.1.1 Crystal strength test. The crystals shall be functionally tested as follows: The case assembly, including crystal, shall be placed flat, crystal up, on a rubber sheet 0.5 mm (0.02 inch) thick, placed on a horizontal, rigid nonresilient, metal surface. A solid steel sphere weighing 15.7 ± 1.4 grams (0.55 ± 0.05 ounces) and 1.6 cm (five-eighths of an inch) in diameter shall then be freely dropped so as to fall 30.5 cm (12 inches) before striking the crystal. Any visible damage to the crystal shall be cause for rejection.

4.6.2 Strap. The strap shall be examined for compliance with 3.4.7.

4.6.3 Case.

4.6.3.1 Battery servicing. The case shall be visually inspected to determine the conformance to 3.4.9.1. A physical test shall be applied where case parts are not capable of being removed to determine conformance to 3.4.9.1. The physical test shall consist of applying a force or prying under normal pressure (equivalent to 40.5 ± 4.5 N (9 ± 1 pounds) direct force) in such a manner that no marking or scarring of the case and case finish shall result.

4.6.3.2 Finish and color. The case shall be visually inspected to determine the conformance to 3.4.9.2.

4.6.4 Radiological.

4.6.4.1 Contamination. Completed watches shall be checked for contamination in accordance with 3.6.1. A Metrical GN-6 or equivalent wipe, moistened with deionized or distilled water, shall be used to wipe the watches. All exterior surfaces of the completed watch shall be thoroughly wiped. The wipe shall be placed in the liquid scintillation solution within 1 minute after wiping each watch. The amount of radiological contamination on the wipe shall be determined using a liquid scintillation counting technique. Results indicating removable contamination over the entire watch of more than 100 dpm shall constitute failure of this test.

4.6.4.2 Diffusion and water leakage. Completed watches shall be checked for diffusion in accordance with 3.6.3 and water leakage in accordance with 3.5.5. They shall be submerged in a measured volume of distilled or deionized water, equal to approximately 10 times the volume of the watch, for 24 hours at $23 \text{ }^\circ\text{C} \pm 1 \text{ }^\circ\text{C}$ ($73 \text{ }^\circ\text{F} \pm 3 \text{ }^\circ\text{F}$). Watches shall be removed from the water. This is the test procedure for radiological diffusion, and if the radioactive content of the water exceeds 50 nanocuries per 24 hour period, it shall constitute failure of the test. The watches shall also be examined for water leakage, and if there is water in the crystal bowl at the completion of the test, it shall constitute failure of the water resistance test. Failure of watches in either of these tests shall be cause for refusal by the government to continue acceptance of the

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production watches until evidence has been provided by the contractor that corrective action has been taken to eliminate the deficiencies.

4.6.5 Design. The watch shall be visually examined for conformance to 3.4.

4.6.5.1 Design approval. Manufacturing data on movement and case design shall be forwarded to the government activity identified in 6.3 (see 3.4.1).

4.6.5.2 Mechanical power. Movement identity, design and construction (stem mount and stem set) shall be determined prior to qualification testing for compliance with 3.4.2.1.1. With the watch fully wound, it shall be examined for continuous running, without rewinding, for the minimum time specified in 3.4.2.1.1.

4.6.5.3 Jewel bearings. One percent of the watches under contract, but not less than three watches, shall be examined to ensure the watches contain the appropriate number of jewels placed at the most critical friction points, and are in compliance with 3.4.2.1.2.

4.6.5.4 Electrical power. Movement identity, design, construction, availability and marking of the power cell shall be determined prior to qualification testing for compliance with 3.4.2.2. The watch shall be tested to ensure that the current drain allows an operating life as specified in 3.4.2.2. The watch shall be measured with a current meter to determine the timekeeping current drain. To allow sufficient latitude in available power, the capacity of the power cell as measured in milliampere-hours (ma hours) shall be derated by 20 percent to obtain the net power capacity of the power cell. The comparison of power drain from the watch to the power capacity of the derated power cell shall be made to ensure that a minimum life of 30 months can be obtained from the power cell. The internal contacts for the cell shall be inspected for conformance with 3.4.2.2.

4.6.5.5 Hand adjustment. A standard type pull gauge with appropriate adapter shall be used to apply the pull specified in 3.4.3. The crown shall not be damaged or separated from the movement when the pull is applied.

4.6.5.5.1 Hand setting. To ensure compliance with the hour and minute “hand” setting of 3.4.3.1, six settings shall be made in 2-hour increments.

4.6.5.5.2 Second hand stop mechanism. To ensure compliance with the second hand stop mechanism of 3.4.3.2, the second hand setting mechanism shall be activated for at least five different settings, to ensure that a precise stop and start action can be obtained without adverse effect on the hands or movement.

4.6.5.6 Elapsed time ring, type III. The elapsed time ring shall be examined for conformance to 3.4.4. The elapsed time ring shall move only when subjected to a torque applied clockwise and counterclockwise of 180 ± 40.0 mNm (26 ± 6 inch-ounces). With the index at the 3 o'clock position of the dial, a force of 44.5 ± 2 N ($10 \pm 1/2$ pounds) shall be applied to the lower side of the elapsed time ring without the ring being damaged or separated from the case.

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4.6.5.7 Case bars, types II and III. Type II and III case bars shall be checked for conformance to 3.4.5. With the watch held in a secured position and the strap held in a position that shall not exert pressure on the buckle or the keeper of the strap, a pulling force of 67 ± 2 N ($15 \pm 1/2$ pounds) shall be applied to each case/spring bar via the strap without the case/spring bar permanently bending, loosening or causing damage to the case/spring bar or case assembly.

4.6.5.8 Case markings. All numbers and lettering shall be visually inspected for correctness, legibility, and application in accordance with 3.4.8. Inspection for permanent marking shall ensure that acceptable processes have been applied, such as: Casting, molding, steel stamp, acid, etching, or engraving.

4.6.5.9 Vibration. The watch shall be vibrated in accordance with 3.5.1.

4.6.5.10 Shock. In compliance with 3.5.2, while running, the watch shall be dropped from a height of 50 cm (19.7 inches), uncontrolled, onto vinyl tile 3 mm (one-eighth of an inch) thick affixed to concrete block. At the conclusion of this test, the watch shall be running and be subjected to a visual and tactile examination in compliance with 3.4.6 for any crystal damage or loose, missing or damaged parts. After passing this examination, the watch shall be subjected to the test in 4.6.5.11.

4.6.5.11 Storage. In compliance with 3.5.3, the watch shall be subjected to storage temperatures for the times and in the order shown in table I. (Unless otherwise specified, the humidity is the ambient humidity.) Temperature changes in the watch may be gradual to avoid thermal shock. All watches shall have the battery in the watch. There shall be no evidence of physical defects, damage on the watch, or imperfections of crystal. After passing this test, the watch shall be subjected to and meet the requirements of 3.5.10. NOTE: The mechanical watches shall not be run during storage tests.

4.6.5.12 Water resistance. The watch shall be examined to determine conformance with 3.5.4. The watch shall be tested by immersing it completely for at least 5 minutes in distilled water containing a wetting agent of approximately 1 percent by weight at room temperature and atmospheric pressure of 1 atmosphere (14.7 pounds per square inch) for 5 minutes. For an additional 5 minutes, the watch shall be immersed under a pressure of 3 atmospheres (44.1 pounds per square inch). The watch interior shall then be inspected for moisture by placing it on a heating element at $40.6 \text{ }^\circ\text{C} \pm 1 \text{ }^\circ\text{C}$ ($105 \text{ }^\circ\text{F} \pm 2 \text{ }^\circ\text{F}$) for 5 minutes, then placing several drops of $21 \text{ }^\circ\text{C} \pm 1 \text{ }^\circ\text{C}$ ($70 \text{ }^\circ\text{F} \pm 2 \text{ }^\circ\text{F}$) water on the center of the crystal. Any visible condensed water (fogging) on the inside of the crystal constitutes failure of this test.

4.6.5.13 Synchronization. The watch shall be examined to determine conformance with 3.5.6. The setting mechanism shall be activated and readings taken when the minute hand is at 12 and the hour hand is at the 3, 6, 9 and 12 hour respectively, to determine compliance with 3.5.6.

4.6.5.14 Magnetism. A magnetic field shall be generated electrically using standard test equipment capable of developing the magnetic intensity (in Gauss) within the limits specified in 3.5.7. With the watch running, it shall be placed into the energized field in the manner specified in

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4.6.5.14.1 or 4.6.5.14.2 as applicable, with the stem parallel to the direction of the field. Upon completion and removal from the field, the watch shall be rated by a precision type rate recorder to determine compliance with 3.5.7.

4.6.5.14.1 Magnetism - type I. Watches shall be subjected to the field specified in 3.5.7, with the field on for 3 seconds and off for 3 seconds. This cycle shall be repeated 10 times.

4.6.5.14.2 Magnetism - types II and III. Watches shall be subjected to the field specified in 3.5.7, for 10 minutes.

4.6.5.15 Dark viewing. A dark room shall be used to represent total darkness when conducting the visual examination under the conditions and distance specified in 3.5.8 to determine compliance therewith. Watches shall be in the dark room for at least 8 hours prior to conducting examinations. Individual(s) performing the test shall be acclimated to the dark room for a minimum of 20 minutes prior to conducting the test. There shall be no intervention required, for example, by pushing a button, on the part of the individual in order to read the watch. This test shall be performed no sooner than 60 days after assembly of watches.

4.6.5.16 Isochronism (class 4 only). This test shall be conducted concurrently with 4.6.5.17 (see 3.5.9).

4.6.5.16.1 Type I. In the position and at the temperature specified in 3.5.9, the watch shall be fully wound and operated for 4 hours. The watch shall again be fully wound and the rate recorded while fully wound and after 4 hours of operation. The rates shall again be recorded at the 20th and 24th hour. The difference in uniformity of rate between the 4-hour periods shall not exceed 10 seconds.

4.6.5.16.2 Types II and III. This test shall vary from 4.6.5.17 in that the error shall be determined at 6-hour intervals. The difference of error recorded between each 6-hour period shall not exceed 5 seconds.

4.6.5.17 Accuracy. During the conditioning period, the running watches shall be subjected to the test temperatures of table III for at least 4 hours prior to the test. Daily rates shall be recorded for a period of 3 days in each position and the mean daily rate determined therefrom. The watches shall be rejected if the mean daily rate exceeds the requirements of 3.5.10. The mechanical type watches shall be wound at the beginning of each test and each 24 hours thereafter for the duration of the tests (see 4.6.5.16).

4.6.5.18 Altitude - types II and III. Watches shall be subjected to the operating environment specified in 3.5.12.

4.6.5.19 Salt fog - types II and III. Watches shall be subjected to the operating environment specified in 3.5.13. Upon completion of exposure to salt fog, the watches shall be rinsed and allowed to dry for 48 hours prior to examination.

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4.6.5.20 Human perspiration resistance types II and III. Watches shall be subjected to the operating environment specified in 3.5.14.

4.6.5.21 Workmanship. Watches shall be inspected by visual and tactile means to ensure that watches are continually produced in accordance with 3.7.

4.6.5.22 Operating instructions. The operating instructions shall be examined for conformance to 3.8.

4.6.5.23 Long term contamination (Qualification only). Ten watches, packaged in accordance with 6.2 and held in storage for a period of not less than 90 days, shall be subjected to the test in 4.6.4.1 and shall pass the requirements in 3.6.2.

4.6.5.24 Long term accuracy (Qualification only). This test shall only be conducted on watches submitted in conformance with 4.3 to determine compliance with 3.5.11. Each watch shall have met all other conformance requirements and tests herein prior to being subjected to the long term accuracy test. The test shall be conducted at $24.0\text{ }^{\circ}\text{C} \pm 1.7\text{ }^{\circ}\text{C}$ ($75\text{ }^{\circ}\text{F} \pm 3\text{ }^{\circ}\text{F}$) for a total running time of 90 days, half of which time shall have been in a dial-up and half in a crown-down position, alternated at 7-day intervals. In consideration of the normal work week of testing personnel, testing need not be continuous. The mean daily rate for any "individual" watch shall meet the accuracy specified in 3.5.11.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, those personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. 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

6.1 Intended use. Three types of watches are covered by this specification. Types I and II are general purpose watches intended for use in low or no light situations. Type III watch is intended for use by bomber pilots and navigators in low or no light situations on prolonged flights. The intended use, available maintenance and storage of the watch will determine which type of watch is required.

6.1.1 Military unique. The watch covered by this specification is military unique. It has the unique military requirement of being able to be read after 8 hours in total darkness without any intervention on the part of the user, for example, by the push of a button. No commercial equivalent exists.

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6.1.2 Type selection criteria. The following criteria is a guide for watch type selection to match user requirements:

- Type I: Analog, short life (2 years), non-maintainable, antimagnetic, water-resistant
- Type II: Analog, long life (5-10 years), maintainable, antimagnetic, water-resistant, high altitude, corrosion-resistant
- Type III: Analog, long life (5-10 years), maintainable, antimagnetic, water-resistant, high altitude, corrosion-resistant, with elapsed time ring

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Type, class, and color of watch required (see 1.2)
- c. Unit and quantity required
- d. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2)
- e. Case finish and color (see 3.4.9.2)
- f. Packaging requirements (see 5.1)

6.3 Qualification. With respect to products requiring qualification, awards will be made only for such products which, at the time of award of contract, have been tested and approved for inclusion on the applicable qualified products list whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the U.S. Army Armament Research, Development and Engineering Center, Attn: AMSTA-AR-QAW (B-12), Picatinny Arsenal, New Jersey 07806-5000. Information pertaining to qualification of products may be obtained from that activity (see 3.1, 4.3.1, and 4.6.5.1).

6.4 Definitions.

- a. Accuracy error notation. Where algebraic signs are used to denote the direction of timekeeping accuracy error, the plus (+) sign represents “fast” and the minus (-) sign “slow”.
- b. Daily rate. Rate in a 24 hour period. The term “daily rate” is used synonymously with the terms “daily error” and “daily accuracy”.
- c. Mean daily rate. The arithmetic average of individual daily rates (daily errors) with proper regard to algebraic signs in the summation. Unless otherwise specified, the mean daily rate will be based on 3 consecutive days operation.
- d. Error. Algebraic time difference in seconds between the watch being tested and the master timepiece.

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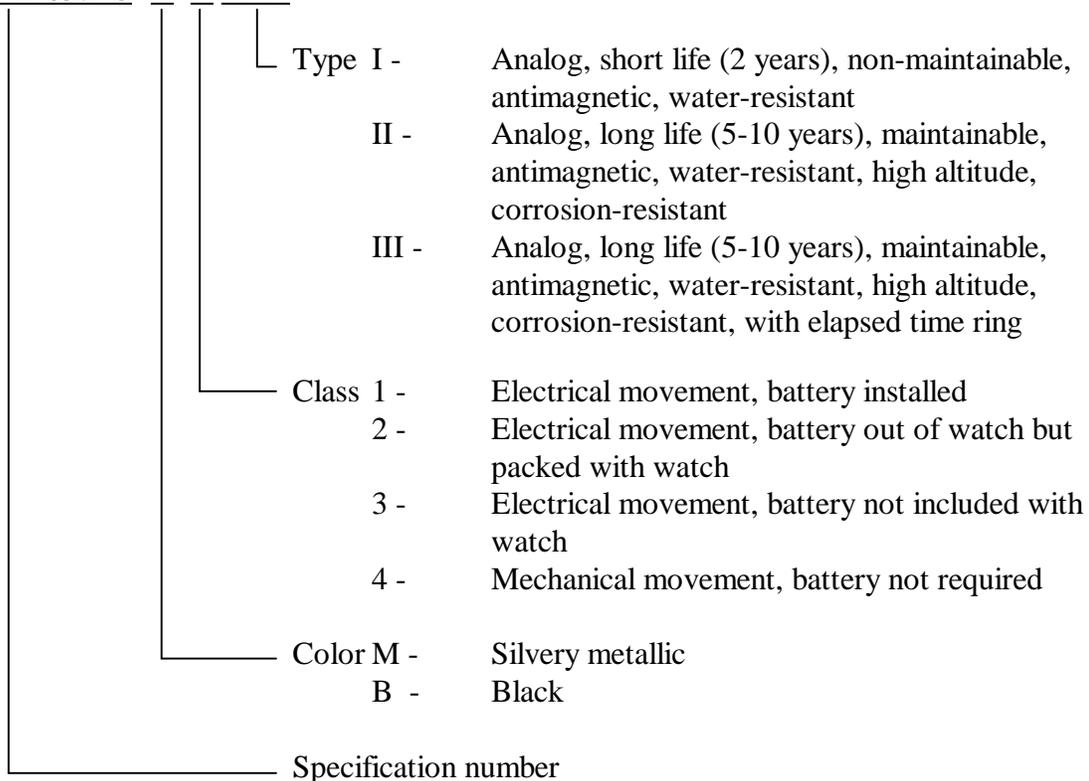
6.5 Cross-reference of classification. Table X is a cross-reference of classification changes from MIL-W-46374F to this specification.

TABLE X. Cross-reference table.

MIL-W-46374F	MIL-PRF-46374G
Type 1	Type II class 4
Type 2	Type I class 4
Type 3	Type I class 1
Type 4	Type I class 2
Type 5	Type I class 3
Type 6	Type III class 1
Type 6	Type III class 2
Type 6	Type III class 3

6.6 Part identification number (PIN). The following part identification numbering procedure is for government purposes and does not constitute a requirement for the contractor. This example describes a part numbering system for specification MIL-PRF-46374G.

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6.7 Subject term (key word) listing.

Analog
Antimagnetic
Water-resistant
Quartz

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

Custodians:
Air Force - 82
Army - AR
Navy - SH

Preparing activity:
DLA - GS

(Project 6645-0446)

Reviewer:
Navy - MC

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

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

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-46374G

2. DOCUMENT DATE (YYYYMMDD)
19991112

3. DOCUMENT TITLE WATCH, WRIST: GENERAL PURPOSE

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)
(1) Commercial
(2) AUTOVON
(if applicable)

7. DATE SUBMITTED
(YYYYMMDD)

8. PREPARING ACTIVITY

a. NAME DEFENSE SUPPLY CENTER RICHMOND

b. TELEPHONE (Include Area Code)
(1) Commercial (804) 279-3875 (2) AUTOVON 695-3875

c. ADDRESS (Include Zip Code)

DEFENSE SUPPLY CENTER RICHMOND, ATTN: DSCR-VBD, 8000
JEFFERSON DAVIS HIGHWAY, RICHMOND, VA 23297-5610

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:

Defense Standardization Program Office (DLSC-LM)
8725 John J. Kingman road, Suite 2533, Ft. Belvoir, VA 22060-2533
Telephone (703) 767-6888 AUTOVON 427-6888