

INCH-POUND

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SUPERSEDING

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13 March 2006

DETAIL SPECIFICATION

MIRROR ASSEMBLIES, REARVIEW, HMMWV STYLE, 12x8 INCH (NOMINAL),
EXTERIOR MOUNTING

This specification is approved for use by the U.S. Army Tank-automotive and Armaments Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This document covers exterior-mounted, automotive rearview mirror assemblies, without hardware or bracketry required to mount the mirror assembly to the US Army HMMWV, Armored Security Vehicle (ASV), and other type vehicles.

1.2 Classification. Mirror head assemblies are classified as follows:

Type 1 - Mirror Assembly, Duplex, 12x8 inches (nominal), Mini-West Coast Style, Left (Driver's) Side

Type 2 - Mirror Assembly, Duplex, 12x8 inches (nominal), Mini-West Coast Style, Right (Passenger) Side

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 thru 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

Comments, suggestions, or questions on this document should be addressed to U.S. Army RDECOM, Tank Automotive Research, Development and Engineering Center, ATTN: RDTA-SIE-ES-PLE-SI, MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000 or sent by email to usarmy.detroit.rdecom.mbx.tardec-standardization@mail.mil . 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

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

2.2 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.

FEDERAL STANDARDS

FED-STD-595 - Colors used in Government Procurement

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-P-53030 - Primer Coating, Epoxy, Water Reducible, Lead and Chromate Free
 MIL-DTL-53039 - Coating, Aliphatic Polyurethane, Single Component, Chemical Resistant Coating
 MIL-DTL-64159 - Coating, Water Dispersible, Aliphatic Polyurethane, Chemical Resistant Coating

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from Document Automation and Production Service, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094 or website: <https://assist.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 that are those cited in the solicitation or contract.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME Y14.5M - Dimensioning and Tolerancing (Metric)

(Copies of these documents are available from American Society of Mechanical Engineers, 3 Park Avenue, New York, NY 10016-5990 or website <http://www.asme.org/>.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117 - Standard Test Method of Salt Spray (Fog) Testing
 ASTM C1036 - Standard Specification for Float Glass
 ASTM D5486 - Standard Specification for Pressure-Sensitive Tape for

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Packaging, Box Closure, and Sealing

(Copies of these documents are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 <http://www.astm.org/>.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

- SAE J964 - Test Procedure for Determining Reflectivity of Rear View Mirrors
- SAE J2527 - Performance Based Standard for Accelerated Exposure of Automotive Exterior Materials Using a Controlled Irradiance Xenon-Arc Apparatus

(Copies of these documents are available from the Society of Automotive Engineers, Department 105, 400 Commonwealth Drive, Warrendale, PA 15096 <http://www.sae.org/>.)

EUROPEAN ECONOMIC COMMISSION

- EC 31971L0127 - Rear-View Mirrors of Motor Vehicles

(Copies of EC 31971L0127, Section 2.5.3, and the test requirements of EC 31971L0127 Section 2.4.2 and 2.4.3 are available via Internet at the following URL:

http://europa.eu.int/comm/enterprise/automotive/directives/vehicles/dir71_127_cee.html.)

2.4 Other Government regulations, documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

- 12369000 - Chemical Agent Resistant Coating (CARC) Paint System Index
- 12480725 - Mirror, Subassembly, Right Hand
- 12480726 - Mirror, Subassembly, Left Hand

(Copies of these documents are available from the Contracting Officer, or U.S. RDECOM-TARDEC, Attn: AMSRD-TAR-E/MS 268, Warren, MI 48397-5000.)

DEPARTMENT OF TRANSPORTATION REGULATION

- 49 CFR, Part 571.111 - Rearview Mirrors

(Copies of this regulation and related sections are publicly available at the following website. <http://www.access.gpo.gov/nara/cfr/waisidx/49cfr571.html>.)

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U.S. ARMY REGULATION

AR70-75 - Survivability of Army Personnel and Material

(Copies of this regulation are unclassified and publicly available at the following website.
http://www.army.mil/usapa/epubs/70_Series_Collection_1.html.)

2.5 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 (except for related specification sheets), 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 First Article. When specified, a sample shall be subjected to first article inspection in accordance with 4.1.1.

3.2 Materials. Materials shall be as specified herein and in the applicable standards and specifications, and shall meet all of the operational and environmental requirements specified in this document.

3.2.1 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 environmental requirements, meets all other requirements of this specification, and promotes economically advantageous life cycle costs. Used, rebuilt, or remanufactured components shall not be incorporated into the mirror assemblies.

3.2.2 Compatible materials. Components shall be fabricated from compatible materials, inherently corrosion and deterioration resistant or treated to provide protection against corrosion and deterioration, during storage and operational conditions. Dissimilar metals shall not be used in intimate contact with each other except to complete an electrical circuit or protect against galvanic corrosion.

3.3 Design. The Type 1 and 2 mirrors are designed for use on existing US Army-procured HMMWV and ASV equipped with Mini-West Coast Style (MWCS) mirrors only. Some of these vehicles will require use of adapters and brackets which are not described in this document, but are left to the requiring activity.

3.3.1 Performance and dimensions. The mirror housing/case and glass lens shall meet or exceed all performance and dimensional requirements of this document regardless of the material solution used to produce the case, and physical construction and dimensions shall be limited to features shown in Figures 1 and 2 by dimension, notation, or reference documents.

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3.3.2 Regulatory and safety. Mirrors shall meet the applicable regulatory and safety standards (laws and regulations) of the United States of America, North Atlantic Treaty Organization, and European Economic Community, except when formally exempted or waived for US military ground vehicles and watercraft. This requirement includes, but is not limited to, the following:

- a. 49 CFR Sec. 571.111, Standard No. 111, Rearview mirrors.
- b. EC 31971L0127, Section 2.5.3, and the test requirements of EC 31971L0127 Section 2.4.2 and 2.4.3, to include the additional requirement that any partial or full displacement from the mirror housing or sagging of the mirror lens within the mirror housing during test shall be cause for rejection during testing.

3.4 Mirror Housing/Cases. Mirror housing/cases shall be non-metallic (nylon, plastic, or composite), or metal (corrosion-resistant steel or aluminum).

3.5 Mirror Lens. Mirror lenses shall be glass only. The mirror lens and its coatings shall be uniform in color, and free from stains, scratches, blisters, separations, delaminations, and misses.

3.5.1 Mirror Glass. Mirror glass shall be “float glass” only in accordance with ASTM C1036, Type I. In addition, the use of plastic, metal, and non-glass mirror glass shall be specifically prohibited.

3.5.2 Mirror reflective surfaces. The reflective surface shall be first surface chrome, and there shall be no separation of reflective coating from the mirror surface.

3.5.3 Specular reflectivity. Specular reflectivity shall be 50-70 percent (%) when tested according to SAE J964 using the total reflective light in the visible range with an angle of incidence of 45 degrees.

3.5.4 Shatter-resistant capabilities. A second or third surface laminate or coating shall be required that provides the following shatter-resistant capabilities after impact or similar damage when the mirror assembly is used for its intended purposes: 1) prevent or reduce injuries to vehicle crew and occupants from displaced mirror lens materials, 2) enable limited post-impact visual use of the mirror surface by the user, and 3) retain the mirror glass within the head/housing without sagging (displacement from its original shape).

3.6 Convex Mirror Convexity. Convex mirror lens shall have an average radius of 40 inches (nominal) when measured in accordance with the radius measuring method defined in 49 CFR, Chapter V, Part 571.111, Section 12, Determination of Radius of Curvature. When mirror lens orientation is required, it shall be specified for each lens within the applicable Figures 1 and 2 requirements.

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3.7 Mirror Housing/Case Color. Unless specified otherwise in the contract ordering data, the mirror housing/case shall be flat, non-reflective, Black, color number 37030 IAW FED-STD-595. When specified as part of the ordering data, and approved by the requiring activity, permitted alternative colors are lusterless, non-reflective, Desert Tan 686A, color number 33446 or Green 383, color number 34094, IAW FED-STD-595.

3.7.1 Painting and coating restrictions. Items shall not be painted or coated whose operation or function would be adversely affected, such as the mirror surface, fastener threads and elastometric materials with the following exception: bolt, screw, or stud threads and washers may be initially covered as long as the paint or coating doesn't interfere with the intended installation and use of the fasteners and washers or is self-removing without additional effort as part of the installation of the non-visible portion of the thread or hole. Importance is given here because of the known potential Safety hazards and potential negative impacts to operational use when the items are non-conforming.

3.7.2 Metal mirror housing/cases. The cleaning, pre-treating, priming and painting of metal (steel and aluminum) mirror housing/cases shall conform to an appropriate CARC paint system selected from Army drawing no. 12369000 for external application. Reference is made to MIL-C-46168, MIL-P-53030, MIL-DTL-53039, and MIL-DTL-64159.

3.7.3 Non-metallic mirror housing/cases and other components.

3.7.3.1 Color. Non-metallic mirror housing/cases and other components shall be dyed or colored throughout to the required color.

3.7.3.2 UV Resistance. Non-metallic mirror housing/cases and other components shall be certified ultra-violet (UV) light resistant and color stabilized for not less than 10 calendar years from date of manufacture. When tested to SAE J2527, test plaques shall show a Delta E color variation of no greater than 3.0 and be no worse than 4.0 on the gray scale.

3.7.3.3 CARC paint. The exterior and interior non-glass surfaces shall not be adversely affected by the application or over-spray of MIL-STD CARC Paints and CARC Primers. Use of actual production housing/cases, other components, or representative sample coupons of production materials for verification are permitted.

3.7.3.4 Surface finish. Non-metallic mirror housing/cases and other components shall have surface finishes equal to or better than the requirements specified for similar metallic components above, and shall be free from cracks, tears, delaminations, bumps, inclusions, and sags.

3.7.4 Housing/case exterior features. Stipples, random and non-random patterns, texturing, reinforcing ribs, curvatures of flats and corners, and other similar features are permissible for all mirror housings/cases provided that they do not conflict with or reduce performance criteria (including dimensions), or any other requirement of this document.

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3.8 Corrosion Resistance. Mirror assemblies shall evidence no corrosion, discoloration, silvering deterioration, or any visually apparent reduction in reflectivity when subjected to corrosive environmental effects.

3.9 Abrasion Resistance. When subjected to abrasion and cleaning, no visible damage shall be evident and the reflectivity of the mirror lens shall not be reduced by more than 2 percent.

3.10 Identification and marking. Mirror assembly identification and marking shall be permanent, legible, and shall include the manufacturer's identification code (CAGE), National Stock Number (NSN), the part identification number (PIN) (see 6.5), and either "RIGHT" (right) or "LEFT" (left), as applicable, on each mirror. Marking shall be on any flat, non-reflective surface, readily visible to a user standing on the ground immediately adjacent to the side of the vehicle, in letters within .19-.25 inches high. When identification plates are used, they shall be installed following application of any final finish coat.

3.11 Nuclear, Biological, and Chemical (NBC) Operations. Mirror assemblies shall be NBC contamination survivable, capable of operating in an NBC environment, and decontaminable to negligible risk levels as defined in Army-approved NBC contamination survivability criteria and AR70-75. The design of the mirror assembly shall minimize the collection and retention of contaminants and decontaminants. Nuclear survivability is not required.

3.12 Operations in NBC and Arctic Environments. Mirror assemblies shall be capable of being operated and serviced by personnel wearing Mission Orientated Protective Posture (MOPP IV) NBC and, separately, issue Arctic gloves clothing, without special tools or special support equipment peculiar to subject mirror assemblies.

3.13 Altitude. Each mirror assembly shall be capable of unrestricted operations within its intended use when operating at altitudes from minus 200 US Feet below to plus 40,000 US Feet above Mean Sea Level (-200' to +40,000' from MSL), without restrictions or kits.

3.14 Vibration. Mirror assemblies shall be resistant to multi-axis vibration and deflections resulting from strain, shocks, vibrations and other detrimental conditions incident to sustained US military operations by ground vehicles and watercraft.

3.15 Temperature range. Mirror assemblies shall be capable of operating in direct sunlight, and in the presence of other direct and indirect heat sources, in ambient temperatures from minus 65 °F to plus 200 °F (-65 °F to +200 °F) without restrictions or additional kits, when used as intended.

3.16 Dimensional Tolerances. Unless specified otherwise within this document or each Figure, dimensional tolerances (only) shall be in accordance with ASME Y14.5M or its ISO equivalent.

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4. VERIFICATION

4.1 Classification of inspections.

4.1.1 First Article Inspections and Tests (FAI/FAT). FAI/FAT shall consist of the contractor-conducted examinations, tests, and certifications listed in Section 4 performed on not less than (NLT) three (3) test mirror assembly samples selected by the Government from the first production lot. For those examinations and tests not specifically described, contractor certificates of conformance shall be required.

4.1.2 Conformance Inspection. Conformance inspections shall consist of the minimum necessary examinations, tests, and certifications determined and conducted by the contractor to verify conformance to regulatory, design, performance, and contractual or purchase order requirements. These are normally performed during production, final inspection and test, and prior to presentation to the Government for acceptance and/or additional testing by the Government. Conformance inspections shall also be performed on all test samples prior to any Control Tests (CT), Production Comparison Tests (PCT), and First Article Test (FAT).

4.1.3 Control Tests (CT). Control Tests shall be performed by the contractor on one representative sample selected by the Government from each production lot, or not less than one test sample if specified and scheduled based on time or units produced by the contractor's Quality Program or Plan. The total number and types of sample mirror assemblies shall be based on monthly production schedule, or total quantity produced if less than a calendar month. The requirements of this paragraph may be destructive, but shall be limited to those listed in Table I.

4.1.4 Production Comparison Tests (PCT). When specified by the Government as part of the production contract or order, PCT shall be performed by the contractor semi-annually and annually (not to exceed two tests per production calendar year) to the same examinations, tests, and certifications as FAT on one or more production samples randomly selected by the Government.

4.1.5 Additional tests. The Government may, at its option and expense, conduct additional examinations, tests, and document reviews as it deems necessary to assure product conformance and quality controls.

4.2 Responsibility for inspection. The contractor is responsible for the performance of all inspections (examinations and tests), to include the writing, publishing, and storage of all reports and records of inspections, examinations, and testing.

4.2.1 Contract Inspection and Test Records. The contractor shall test and record results, provide certifications and reports to the acquiring activity, and maintain substantiating test reports, specimens, and other objective quality evidence that the product offered meets the salient characteristics of this specification and that the product conforms to the required drawings, specifications, workmanship standards, and quality assurance practices.

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4.2.2 Contractor Certifications and Test Reports. The contractor shall separately certify in each test report and provide objective quality evidence (documentation) that the materials, products, processes, and testing specified herein and in the applicable standards and specifications, shall meet all of the operational and environmental requirements specified in this specification.

Table I. Control Tests.

Test Title	Section 3 Requirement	Section 4 Requirement	Control Tests
Test Reports		4.2.1	X
Certifications		4.2.2	X
Government Option		4.2.3	X
Materials	3.2	4.3.2	X (Cert)
Design	3.3	4.3.3	X (Cert)
Perf & Dimensions	3.3.1	4.3.3	X (Cert)
Regs and Safety	3.3.2	4.3.3, 4.3.5.4	X (Cert)
Mirror Assemblies	3.4	4.3.4	X (Cert)
Mirror Lens	3.5	4.3.5	X
Mirror Lens Glass	3.5.1	4.3.5.1	X
Mirror Lens Surface	3.5.2	4.3.5.2	X
Specular Reflectivity	3.5.3	4.3.5.3	X
Shatter-resistant	3.5.4	4.3.5.4	X
Mirror Convexity	3.6	4.3.6	X
Housing/Case Color	3.7	4.3.7	X
Paint/Coating Restrictions	3.7.1	4.3.7.1	X
Metal Housings	3.7.2	4.3.7.2	X
Non-metallic Housings	3.7.3	4.3.7.3	X
Color	3.7.3.1	4.3.7.3.a	X
UV Resistance	3.7.3.2	4.3.7.3.b	X (Cert)
CARC Paint	3.7.3.3	4.3.7.3.c	X
Surface finish	3.7.3.4	4.3.7.3.d	X
Stipples/Patterns/Etc	3.7.4	4.3.7.4	X
Corrosion Resistance	3.8	4.3.8	X (Cert)
Abrasion Resistance	3.9	4.3.9	X
Identification/Marking	3.10	4.3.10	X
NBC	3.11	4.3.11	X (Cert)
NBC & Arctic Ops	3.12	4.3.12	X (Cert)
Altitude	3.13	4.3.13	X
Vibration	3.14	4.3.14	X
Temperature Range	3.15	4.3.15	X
Dimensional Tol.	3.16	4.3.16	X
Reserved	N/A	N/A	N/A

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4.2.3 Government-conducted Inspections and Tests. The Government reserves the right to require proof of such conformance prior to the first delivery and thereafter as may be otherwise provided for under the provisions of the contract. Items with known defects shall not be submitted for Government acceptance.

4.3 Examinations, Tests, and Certification. Unless specifically authorized within Section 4 of this specification, the following practices are prohibited: acceptance by similarity or reference; modeling and simulation; waiver based on previous contracts or successful testing; and use of lot sampling or similar inspection and acceptance schemes. Failure to successfully demonstrate one or more requirements of this specification, contract, or purchase order shall be cause for rejection of the whole lot and all other items produced by the contractor since the previous successful test(s).

4.3.1 (Reserved)

4.3.2 Materials. To verify 3.2, the contractor shall certify compliance and make available to the Government, upon request, all records of purchase, inspection, examination, test, and specimens used to provide objective quality evidence of conformance.

4.3.3 Design. To verify 3.3, the contractor shall certify that the mirror housing/case and glass lens meet or exceed all regulatory, safety, performance, and dimensional requirements of this document regardless of the material solution used to produce the housing/case. Physical construction and dimensions shall be limited to features shown in Figures 1 and 2 by dimension, notation, or reference documents.

4.3.4 Mirror assemblies. Each mirror assembly shall be visually and tactilely inspected by the contractor to confirm that all mirror assemblies, mirror housing/cases and mirror lenses meet the material requirements of 3.4 regardless of design solution used.

4.3.5 Mirror Lens. To verify conformance with 3.5, each mirror lens shall be visually and tactilely inspected by the contractor to confirm lenses are float glass only with a first surface chrome reflective coating, both of which are uniform in color, and free from stains, scratches, blisters, separations, delaminations, and misses.

4.3.5.1 Mirror lens adhesion test. To determine conformance to 3.5.1, a strip of pressure-sensitive tape, 1 inch wide 3M© Tape No. 351, or Government-approved ASTM D5486 equivalent, shall be securely applied to the coated side and over the edges of mirror glass in an ambient air temperature of 68 ± 2 °F. The tape shall be stripped off in one slow, steady motion, and no separation of reflective coating from the mirror permitted.

4.3.5.2 Mirror lens materials and performance. The requirements of 3.5.2, 3.3.2., and 3.4 shall be confirmed concurrently by material and performance certifications, purchase order reviews, visual examinations, and such other testing the contractor deems appropriate.

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4.3.5.3 Specular reflectivity. The requirements of 3.5.3 shall be verified by testing in accordance with SAE J964 using the total reflective light in the visible range with an angle of incidence of 45 degrees. Failure to demonstrate the required 50-70 percent (%) reflectivity shall be cause for failure.

4.3.5.4 Shatter-resistant capabilities. The requirements of 3.3.2.b and 3.5.4 shall be verified by testing in accordance with EC 31971L0127 sections 2.4.2 and 2.4.3, with results being interpreted in accordance with the requirements of EC 31971L0127 section 2.5. After testing, each mirror assembly shall be visually inspected by the contractor to confirm that all mirror assemblies, mirror housing/cases and mirror lenses meet the following criteria: 1) potential injuries to vehicle crew and occupants from displaced mirror lens materials have been prevented or reduced, 2) limited post-impact visual use of the mirror surface remains, and 3) the mirror glass is retained within the head/housing without sagging (displacement from its original shape).

4.3.6 Convex Mirror Convexity. The requirements of 3.6, Figures 1 and 2, and any additional mirror orientations shall be verified in accordance with the radius measuring method defined in 49 CFR, Chapter V, Part 571.111, Section 12, Determination of Radius of Curvature.

4.3.7 Mirror housing/case. The requirements of 3.7 shall be verified by observations and industry standard testing to confirm compliance with FED-STD-595 to include, but not be limited to, color, reflectivity, and surface texture, workmanship and finish, conformance certification of materials and processes.

4.3.7.1 Painting and coating restrictions. The requirements of 3.7.1 shall be separately verified and reported by the contractor through visual inspections; material and process certifications; UV resistance certifications, when applicable, and the testing required and described below in this paragraph.

4.3.7.2 Metal mirror housing/cases. To verify 3.7.2, metal (steel and aluminum) mirror housing/cases requirements shall be verified by the tests and observations listed in/on Army drawing no. 12369000 for external application, MIL-C-46168 and MIL-P-53039, or the approved CARC primers such as MIL-P-53030, as applicable.

4.3.7.3 Non-metallic mirror housing/cases. To verify the requirements of 3.7.3, non-metallic mirror housing/cases shall be subjected to the following:

- a. Sectioned to visually verify correct color and full color penetration through the entire thickness and interior surface of the product.
- b. When exposed in a Xenon arc weathering chamber in accordance with SAE J2527 for a total of 12,480 KJ/m² (simulated 10 year real world exposure), test plaques will show a Delta E color variation of no greater than 3.0 and be no worse than 4.0 on the gray scale.

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- c. Shall demonstrate by actual test that they are not adversely affected by the application or over-spray of MIL-STD CARC Paints and CARC Primers. To determine conformance, the exterior non-glass surfaces, or sample coupons of production materials, will be coated with MIL-STD CARC paint and CARC primers. The exterior surfaces and mating joints shall be examined and tested to assure that no material and surface degradation, or shrinkage has occurred as a result of the CARC coating and overspray after 12, 24, 72, and 168 hour periods.
- d. Shall demonstrate by visual inspection and actual measurement surface finishes equal to or better than the requirements specified for metal mirror housing/cases and shall be free from cracks, tears, delaminations, bumps, inclusions, and sags.

4.3.7.4 Housing/case exterior features. To confirm the requirements of 3.7.4, visual, tactile, and documentation inspections shall be made to confirm stipples, random and non-random patterns, texturing, reinforcing ribs, curvatures of flats and corners, and other similar features do not conflict with or reduce the performance (including dimensions) to any other requirement of this document.

4.3.8 Corrosion Resistance. The requirements of 3.8 shall be demonstrated by 1) the following test and 2) no visual or tactile demonstration of corrosion, discoloration, silvering deterioration, or any apparent reduction in reflectivity. Each disassembled test sample mirror shall be subjected to the corrosion test specified in ASTM B117 standard. Salt solution shall be 20 percent by weight. Length of exposure shall be 50 hours +1 hour. At completion of test and prior to mirror being inspected, residue shall be removed by cleaning with a soft, unbleached cloth. The test mirror assemblies and lenses shall evidence no disorientation of parts, visible mechanical damage, discoloration, silvering deterioration, reduction in reflectivity, or any partial or full displacement of the mirror lens from the mirror housing during or within 24 hours after testing.

4.3.9 Abrasion Resistance. To determine conformance to 3.9, each test sample mirror lens(s) reflecting surface shall be cleaned with a soft, unbleached Canton flannel cloth and dusted on the nap side with dry soil passed through a 200-mesh sieve. The reflecting surface shall be rubbed with the cloth for 30 seconds using a rotary motion. The foregoing cleaning cycle shall be repeated 30 times, and then examined for any visible damage due to the above abrading prior to testing for specular reflectivity. With an angle of incidence of 45 degrees, total reflective light in the visible range shall exceed 50 percent in accordance with SAE J964. At the completion of this test, no visible damage shall be evident and the reflectivity of the mirror lens shall not be reduced by more than 2 percent. Test failure shall occur if there's visible damage and/or decrease in reflectivity below the required 50 percent minimum.

4.3.10 Identification and marking. The requirements of 3.10 shall be verified by visual examination and tests. The requirement of "readily visible to a user standing on the ground immediately adjacent to the side of the vehicle" shall be verified by detailed engineering analysis and an on-vehicle demonstration with a HMMWV series truck.

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4.3.11 Nuclear, Biological, and Chemical (NBC). Unless specified in the ordering data, or when ordered by the Government or a third-party as part of a ground vehicle system which requires actual test performance, the contractor shall self-certify compliance with the NBC Decontamination requirements of 3.11 based on the material and adhesive suitability of the mirror assembly and its components. Any actual testing to the requirements of 3.11 shall be done by the Government due to the hazards involved. NOTE: On existing HMMWV and ASV ground vehicle designs, as of the date of this specification, it's assumed that the MOPP-IV clothing operations capabilities are sufficient due to previous qualification by Government testing of the HMMWV vehicle system.

4.3.12 Operations in NBC and Arctic Environments. Unless specified in the ordering data, or when ordered by the Government or a third-party as part of a ground vehicle system which requires actual test performance, the contractor shall self-certify compliance with 3.12 based on the materials and adhesives suitability of the mirror assembly and its components. Any actual testing to the requirements of 3.12 shall be done by the Government due to the hazards involved. NOTE: On existing HMMWV and ASV ground vehicle designs, as of the date of this specification, it is assumed that the NBC and Arctic clothing operations capabilities are sufficient due to previous qualification by Government testing of the HMMWV and ASV vehicle system.

4.3.13 Altitude. To verify conformance with 3.13, test samples shall be tested IAW MIL-STD-810 (Revision F, 01 Jan 00, Change 3, Part 2), Method 500.4, Low Pressure (Altitude), Procedure I-Storage/Air Transport and Procedure IV-Explosive Decompression. The test mirror assemblies and lenses shall evidence no disorientation of parts, visible mechanical damage, discoloration, silvering deterioration, reduction in reflectivity, or any partial or full displacement of the mirror lens from the mirror housing during or within 24 hours after testing.

4.3.14 Vibration. To determine conformance to 3.14, each mirror assembly test specimen shall be mounted on a vibration machine with vibration brackets without application of tension or compression from the vibration brackets to the mirror assembly. Mirror assembly shall be vibrated for 1 hour in each of its three axes. Vibration shall be in a periodic cycle from 10 to 55 and back to 10 cycles per second (cps) through an amplitude of 0.030 inch (total excursion 0.060 inch) within a period of one (1) minute. The test mirror assemblies and lenses shall evidence no disorientation of parts, visible mechanical damage, discoloration, silvering deterioration, reduction in reflectivity, or any partial or full displacement of the mirror lens from the mirror housing during or within 24 hours after testing.

4.3.15 Temperature range. To verify the requirements of 3.15, mirror assemblies shall be tested IAW MIL-STD-810 (Revision F, 01 Jan 00, Change 3, Part 2), Method 503.4, Temperature Shock, Shock from Constant Extreme Temperatures, using the following criteria for the test plan/execution. The test mirror assemblies and lenses shall evidence no disorientation of parts, visible mechanical damage, discoloration, silvering deterioration, reduction in reflectivity, or any partial or full displacement of the mirror lens from the mirror housing during or within 24 hours after testing.

- a. T1= -65 °F and T2= +200 °F

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- b. a-b, c-c, and d-f times are not less than 30 minutes each
- c. “b-c” and “c-d” times are as stated (nor more than one minute)
- d. Not less than ten (10) continuous and uninterrupted cycles for each test sample assembly.

4.3.16 Dimensional Tolerances. The requirements of 3.16 shall be verified by contractor certification, and the normal and continuing Government oversight of contractor design, processes, and manufacturing operations.

4.4 (Reserved)

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 materiel is to be performed by DOD personnel, these 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 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. Subject mirror assemblies are commercially not available and intended for use on U.S. Army-procured HMMWV, ASV, and other vehicles equipped with similar size and shape mini-West Coast Style (MWCS) rearview mirrors, some of which may require use of adapters and fasteners. Other ground vehicles and watercraft may use these mirrors, but each system manager must notify and coordinate use with the acquisition activity to prevent configuration conflicts with this specification. For standardization purposes across all Army vehicles, subject mirror assemblies are intended to be procured with standard mounting hardware not defined in this specification. It is deemed more cost effective for vehicles not requiring this hardware to dispose of it, than to provision separate mirror assemblies without mounting hardware. See 6.2.

6.2 Ordering data. Acquisition documents shall not provide for direct procurement of the mirror assemblies defined by this specification, but shall instead reference mirror assemblies with mounting hardware included, as specified by government drawings 12480725 (Mirror

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Subassembly, Right Hand) and 12480726 (Mirror Subassembly, Left Hand). References to this specification must specify the following:

- a. Title number, and date of this specification.
- b. PIN number of mirror assembly furnished (see Figures 1 and 2)
- c. Color of mirror case if other than specified.
- d. Deletion or substitution of First Article Test (FAT) requirements.

6.3 Cross-reference data. Mirrors conforming to this document are interchangeable or substitutable with similar type and size mirrors conforming to previous HMMWV and ASV mirror drawings and specifications. Current National Stock Number assignments are listed below:

- a. 2540-01-314-1189, right-hand, MWCS, 12"x8" (nominal)
- b. 2540-01-314-1190, left-hand, MWCS, 12"x8" (nominal)

6.4 Part Identifying Number (PIN). PINs to be used for mirrors acquired to this document are as follows:

- M32201-1 - Mirror Assembly, Duplex, 12x8 inches (nominal), mini-West Coast Style, Left (Driver's) Side.
- M32201-2 - Mirror Assembly, Duplex, 12x8 inches (nominal), mini-West Coast Style, Right (Passenger) Side.

6.5 Subject term (key word) listing.

ASV
Automotive
Glass
Mini-West Coast (MWCS)
Vehicle

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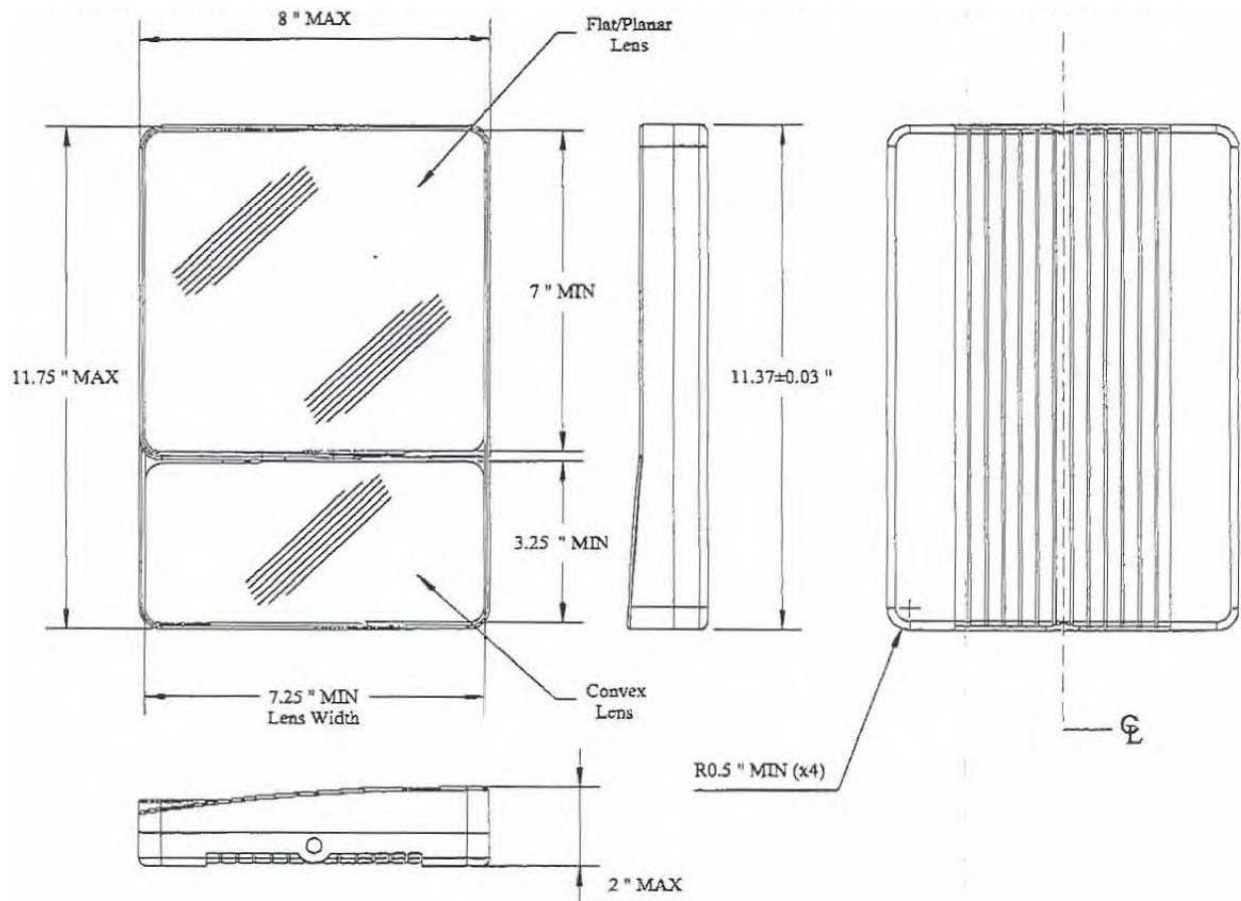


FIGURE 1. Type 1 - Duplex Mirror, 8x11 Inches, Mini-West Coast Style, Left.

NOTE:

1. The upper and lower mounting holes, with threaded metallic inserts, shall be located on and with the same vertical axis as the indicated center line shown in the figure above, and shall accept screw MS90725-39-2.
2. The threaded length of the threaded metallic insert shall be no less than 0.25" nor greater than 0.50". In addition, the mounting hole depth shall be no less than 2.00".
3. Orientation of the flat/planar lens shall be $0^{\circ} \pm 0.5$ on the vertical axis, in accordance to the alignment of the mounting points, and $0^{\circ} \pm 0.5$ on the horizontal axis, in accordance to the surface of the mirror back.
4. Orientation of the convex lens shall be $4^{\circ} \pm 0.5$ upward on the horizontal axis and $4^{\circ} \pm 0.5$ left (outward) on the vertical axis, in accordance to the surface of the flat/planar lens.
5. "Objects in Mirror Are Closer than They Appear" shall be permanently and indelibly marked at the lower edge of the convex mirror's reflective surface in letters not less than 0.19" nor more than 0.25" high.
6. Caution, the mirror will not conform to FMVSS 111 if the minimum dimensions are not met.

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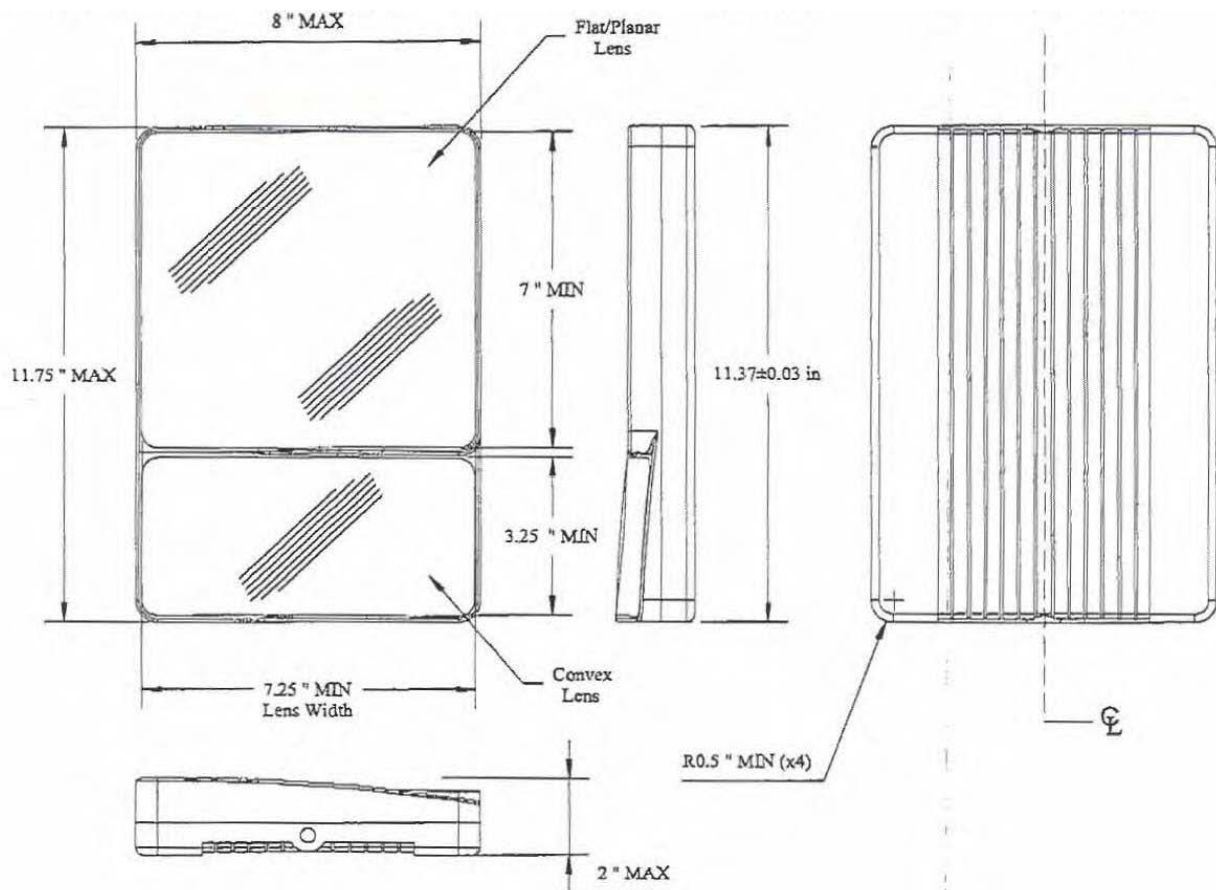


FIGURE 2. Type 2. - Duplex Mirror 8x11 Inches, Mini-West Coast Style, Right.

NOTE:

1. The upper and lower mounting holes, with threaded metallic inserts, shall be located on and with the same vertical axis as the indicated center line shown in the figure above, and shall accept screw MS90725-39-2.
2. The threaded length of the threaded metallic insert shall be no less than 0.25" nor greater than 0.50". In addition, the mounting hole depth shall be no less than 2.00".
3. Orientation of the flat/planar lens shall be $0^{\circ} \pm 0.5$ on the vertical axis, in accordance to the alignment of the mounting points, and $0^{\circ} \pm 0.5$ on the horizontal axis, in accordance to the surface of the mirror back.
4. Orientation of the convex lens shall be $4^{\circ} \pm 0.5$ upward on the horizontal axis and $4^{\circ} \pm 0.5$ left (outward) on the vertical axis, in accordance to the surface of the flat/planar lens.
5. "Objects in Mirror Are Closer than They Appear" shall be permanently and indelibly marked at the lower edge of the convex mirror's reflective surface in letters not less than 0.19" nor more than 0.25" high.
6. Caution, the mirror will not conform to FMVSS 111 if the minimum dimensions are not met.

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6.6 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

Custodians:

Air Force - 184

Army - AT

Review activities:

Army - MT

Air Force - 99

DLA - CC

General Services Administration

FAS

Preparing activity:

Army - AT

(Project 2540-2016-001)

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>.