

INCH-POUND

MIL-S-23389B
w/AMENDMENT 3
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SUPERSEDING
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9 February 2010

DETAIL SPECIFICATION

SHIPPING AND STORAGE CONTAINER, CARTRIDGE, 20MM, M548

This specification is approved for use by all departments and agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers one model steel container for shipping and storing ammunition.

2. APPLICABLE DOCUMENTS

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

Comments, suggestions, or questions on this document should be addressed to the Commander, U.S. Army ARDEC, ATTN: RDAR-QES-E, Picatinny Arsenal, NJ 07806-5000 or emailed to ardecstdzn@conus.army.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>.

ASMC N/A

FSC 8140

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2.1.1 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.

FEDERAL SPECIFICATIONS

TT-C-490	- Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings
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DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-W-12332	- Welding, Resistance, Spot, Seam, and Projection: for Fabricating Assemblies of Low-Carbon Steel
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DEPARTMENT OF DEFENSE STANDARD

MIL-STD-1916	- DoD Preferred Method for Acceptance of Product
MIL-STD-406	- Visual Inspection Standard for Tern Plate Cans and Steel Boxes used in Small Arms Ammunition Packaging

(Copies of these documents are available online at <https://assist.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.1.2 Other Government 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 of these documents are those cited in the solicitation or contract.

US ARMY ARMAMENT RESEARCH, DEVELOPMENT AND
ENGINEERING CENTER (ARDEC) DRAWINGS

D7258943	- Shipping and Storage Container, Cartridge, 20mm, M548
D7258944	- Body Assembly
D7258945	- Cover Assembly
IEL 7259441	- Index of Inspection Equipment List for: Shipping and Storage Container, Cartridge, 20mm, M548
12998172	- Coatings, High Performance (For Ammunition Containers)

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(Copies of these drawings may be requested online at pica.drawing.request@conus.army.mil or from U.S. Army ARDEC, ATTN: RDAR-AIS-TD, Picatinny Arsenal, NJ 07806-5000.)

2.2 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 TESTING AND MATERIALS (ASTM)

ASTM B117	- Method of Test for Salt Spray (Fog) Testing
ASTM D1654	- Standard Test Method For Evaluation of Painted or Coated Specimens to Corrosive Environments

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

AMERICAN SOCIETY FOR QUALITY

ASQC-A8402	- Quality Management and Quality Assurance – Vocabulary
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(Copies may be purchased from the American Society for Quality, 600 North Plankinton Avenue Milwaukee, WI 53203 USA, <http://www.asq.org>.)

3. REQUIREMENTS

3.1 General. – The container shall comply with the requirements of Drawing (Dwg.) D7258943, referenced specifications and other requirements specified herein.

3.2 First article sample. – Unless otherwise directed by the contracting officer, a first article sample shall be required.

3.3 Welding procedure. – Fabrication of the container shall be in accordance with the recorded welding procedure requirements of MIL-W-12332.

3.4 Protective coating.

3.4.1 Phosphate. – The cleaning method and pretreatment process used shall comply with the requirements of Dwgs. D7258944 and D7258945. The phosphate coating shall comply with the requirements of TT-C-490 for appearance and minimum weight, as applicable to the type of phosphate used.

3.4.2 Paint. – The paint coating shall comply with the requirements of Dwgs. D7258944 and D7258945. In addition, the coating shall be smooth, unbroken and free of blisters, runs, thin spots and foreign matter. Adhesion of the paint to the pretreated surfaces shall

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comply with applicable requirements of TT-C-490. Each container body assembly shall be marked on the welded end in accordance with Dwg. D7258944 and each cover assembly in accordance with Dwg. D7258945.

3.4.3 Corrosion resistance. – The exterior surface of the box shall show no visible evidence of paint blistering, creepage (loss of adhesion), or corrosion of base metal in excess of 1/8 inch on either side of the score marks, or rusting of parts of the hardware subject to pressure of abrasion in normal use or exceeding the standards permissible in MIL-STD-406, or more than five (5) scattered blisters or corrosion spots having individual diameters greater than 3/16" in diameter in any 4 x 12 inch flat area, excluding score marks, after exposure to a 5% solution of salt spray for 96 hours.

3.5 Gasket compression. – The gasket compression of the container shall be as specified by Dwg. D7258943. (See 6.4)

3.6 Airtightness. – The assembled container shall withstand, without leakage, an air pressure differential of three pounds per square inch (psi).

3.7 Functioning.

3.7.1 Cover assembly. – The locking hardware shall be operable manually. The cover assembly shall be removable manually, without the use of exorbitant force. The gasket shall remain secure in the correct position within the cover upon removal of the cover assembly. The gasket shall not stick to, be cut or split by contact against the top edge of the body assembly.

3.7.2 Hasp and latch. – Mating parts of the body hasp and latches shall engage without requiring deformation of any container part, and the latches shall close and open freely. When closed the latches of the assembled container shall remain closed until manually opened.

3.7.3 Elevated temperature storage. – Following storage of the container in its closed position at an air temperature of 163 degrees Fahrenheit (°F) minimum for a period of 24 hours minimum and subsequent return to ambient temperature, the container shall function as required in 3.7.1 and 3.7.2.

3.8 Weld security.

3.8.1 Hasp assembly. – Each hasp of the body assembly shall comply with the security requirement of Dwg. D7258944 without permanent deformation or failure of a weld.

3.8.2 Handle assembly. – The handles of the body assembly shall withstand a pull of 600 pounds without permanent deformation of a component or failure of a weld.

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3.8.3 Latch assembly. – The latch assemblies of the cover assembly shall comply with the security requirement of Dwg. D7258945 without breakage or permanent deformation of any of the components or welds.

3.9 Flatness.

3.9.1 Cover assembly. – The cover assembly shall meet the requirements of Dwg. D7258945 for flatness.

3.9.2 Body assembly. – The top edges of the body assembly shall meet the requirements of Dwg. D7258944 for flatness.

3.10 Workmanship. – The requirements for workmanship are as specified by applicable drawings, referenced specifications and the following:

3.10.1 Processing defects. – The container shall be free of cracks, splits, sharp edges, slivers, burrs, severe dents, cuts and scratches, missing or defective welds and components and other forms of unsatisfactory workmanship.

3.10.2 Cleanliness. – The painted container shall be free of all foreign matter.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Quality assurance terms and definitions. – Reference shall be made to ASQC-A8402 for definition of quality assurance terms.

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

1. First Article Inspection (see 4.3)
2. Quality Conformance Inspection (see 4.4)

4.3 First article inspection.

4.3.1 First article sample. – At the beginning of production, a sample representative of the production material, equipment, processes and procedures shall be submitted in accordance with contract requirements and shall consist of 50 painted containers, three

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sets of unassembled component parts, and the welding procedure. Prior to approval of the first article sample, the acquisition of material or components for, or the commencement of production of the balance of the contract quantity shall be at the sole risk of the contractor.

4.3.1.1 First article inspection. – Prior to submission of the first article sample to the Government, the contractor shall inspect all components and assemblies for all contract, drawings and specification requirements. The contractor's inspection shall be subjected to verification by the Government representative.

4.3.1.2 Examination and tests. – The first article sample will be inspected for all requirements of the drawings and specifications at a Government laboratory or such facility specified in the contract. Determination as to approval of any first article sample shall be based only upon results of initial examinations and tests.

4.3.1.3 First article sample failure. – Failure of the sample to comply with requirements of the drawings and specifications will result in sample disapproval.

4.4 Quality conformance inspection.

4.4.1 Submission of product. – The product shall be submitted in accordance with MIL-STD-1916.

4.4.1.1 Lot. – A lot shall consist of assembled containers produced by one manufacturer in one unchanged process, in accordance with the contract, the same drawings and drawing revisions, and same specification and specification revision.

4.4.1.2 Lot identification. – The cover and body assemblies of each container of the lot shall be identified as specified by Dwg. D7258944 and D7258945, supplemented as directed by the procuring activity.

4.4.2 Examination. – Examination for major and minor defects shall be performed as specified herein. Each assembly found to be defective shall be rejected.

4.4.2.1 Verification levels. – The following Verification Levels are assigned:

Major defects	Level IV
Minor defects	Level II

4.4.2.2 AQL's. – DELETED

4.4.3 Classification of defects (see 6.3). – The classification of defects shall be as follows:

4.4.3.1 Body (see Dwg. D7258949, a detail of Dwg. D7258944).

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	<u>Categories and defects</u>	<u>Method of inspection</u>
<u>Critical:</u>	None defined.	
<u>Major:</u>		
101.	Thickness, metal	Gage
<u>Minor:</u>		
201.	Height of body seam	Gage

4.4.3.2 Bottom (see Dwg. B7258950, a detail of Dwg. D7258944).

	<u>Categories and defects</u>	<u>Method of inspection</u>
<u>Critical:</u>	None defined.	
<u>Major:</u>		
101.	Thickness, metal	Gage
102.	Length	Gage
103.	Width	Gage
<u>Minor:</u>	None defined.	

4.4.3.3 Cover (see Dwg. D7258946, a detail of Dwg. D7258945).

	<u>Categories and defects</u>	<u>Method of inspection</u>
<u>Critical:</u>	None defined.	
<u>Major:</u>		
101.	Thickness, metal	Gage
102.	Width, inside cover (2 places)	Gage
<u>Minor:</u>	None defined.	

4.4.3.4 Shipping and storage container, painted (see Dwg. D7258943, D7258944, and D7258945, as applicable).

	<u>Categories and defects</u>	<u>Method of inspection</u>
<u>Critical:</u>	None defined.	

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Major:

101.	Inside width, body assembly, min	Gage
102.	Inside length, body assembly, min	Gage
103.	Inside depth, body assembly, min	Gage
104.	Interior or exterior paint inadequate	Visual <u>1/</u>
105.	Corrosion	Visual
106.	Cracked or split component	Visual
107.	Missing, incomplete, broken or mislocated metal component	Visual
108.	Missing welds	Visual
109.	Mutilated metal component	Visual <u>2/</u>
110.	Steel sliver, burr or sharp edge	Visual-Feel <u>3/</u>
111.	Missing, inverted, loose, misaligned or defective gasket	Visual-Manual <u>4/</u>

Minor:

201.	Outside height	Gage
202.	Outside length	Gage
203.	Outside width	Gage
204.	Marking incorrect, incomplete, illegible or missing	Visual
205.	Foreign matter, except corrosion	Visual

1/ MIL-STD-406 shall be used as a guide to classify paint defects. In the standard, defects classified as incidental shall be considered permissible; defects classified as minor shall be considered major. Missing, damaged or incomplete paint shall be classified a defect. Bare spots on any subassembly which do not accumulate to exceed 1/2 square inch in area or scratches which do not penetrate to the phosphate coating shall be disregarded.

2/ If the body or cover is severely dented or malformed, or the carrying or locking hardware is bent or otherwise distorted to cause a functional failure or become a personnel hazard, the sample unit shall be classed defective.

3/ If a steel sliver, burr or sharp edge which could injure an unprotected hand is found on a ferrule, the bottom edge of a latch or cover skirt, or on the top or bottom edges of the body, the sample unit shall be classed defective.

4/ If the gasket is missing, inverted, broken, split or torn, contains a gross defect in texture or fit, or can be shifted horizontally within the gasket retainer by finger pressure or manual shake of the cover assembly, the sample unit shall be classed defective.

4.4.4 Tests. – The tests listed in Table I shall be performed on each lot in compliance with the test methods and procedures specified by 4.5. The sampling plans for the various tests shall be as specified by Table I. For acceptance, the results of each test shall apply with the applicable requirement(s).

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Table I. Tests

<u>Test</u>	<u>Sample Size</u>		<u>Item</u>	<u>Requirement</u>
Phosphate coating	<u>1/</u>		3-Standard panels, TT-C-490	3.4.1
Paint adhesion	<u>2/</u>	3	Containers	3.4.2
Corrosion resistance	<u>3/</u>	2	Containers	3.4.3
Gasket compression	<u>4/</u>	10	Containers	3.5
Airtightness	<u>5/</u>	50	Containers	3.6
Functioning	<u>6/</u>	8	Containers	3.7
Weld Security	<u>7/</u>	8	Containers	
Hasp			Body assemblies	3.8.1
Handle			Body assemblies	3.8.2
Latch			Cover assemblies	3.8.3
Flatness	<u>8/</u>	50	Containers	
			Cover assemblies	3.9.1
			Body assemblies	3.9.2

1/ Failure of the phosphate coating on the standard panels to comply with the applicable requirements for appearance and minimum weight, shall be cause for rejection of all container subassemblies phosphated since the preceding test.

2/ Failure of one or more units of the sample to comply with the requirements for paint adhesion shall be cause for rejection of the lot.

3/ Failure of one or more units of the sample to comply with the requirements for corrosion resistance shall be cause for rejection of the lot.

4/ An inspection plan from MIL-STD-1916, with Verification Level I shall be used to determine lot acceptability. Failure of the sample to meet the acceptability criterion shall be cause for rejection of the lot.

5/ Failure of four or more units of the sample to comply with the requirement for airtightness shall be cause for rejection of the lot. If two or three units of the sample fail to comply with the requirement, a second sample consisting of the same number of units as specified for the first sample shall be tested. If in the accumulated samples, five or more units fail to comply with the requirement, the lot shall be rejected. A stream or recurring succession of bubbles from any surface, seam or gasket junction shall be evidence of a defective container.

6/ Failure of two or more units of the sample to comply with the specified functioning requirements shall be cause for rejection of the lot. If one unit fails to comply with the requirements, a second sample consisting of the same number as specified for the first sample shall be tested. If in the accumulated samples, two or more units fail to comply with the requirements for functioning, the lot shall be rejected.

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7/ Failure of one or more units of the sample to comply with the specified requirements for weld security of hasp assemblies, latch assemblies or handle assemblies shall be cause for rejection of the lot.

8/ Failure of four or more units of the sample to comply with the requirement for flatness shall be cause for rejection of the lot. If two or three units of the sample fail to comply with the requirement, a second sample of the same number of units as specified for the first sample shall be tested. If in the accumulated samples, five or more units fail to comply with the requirement the lot shall be rejected. The sampling plan shall apply independently to cover and body assemblies.

4.4.5 Packaging, packing and marking inspection. – DELETED.

4.4.6 Inspection equipment. – Index of Inspection Equipment List (IEL) 7259441 identifies the applicable Inspection Equipment Lists required to perform examination and tests prescribed herein. Equipment design(s) shall be in accordance with the applicable IEL code designations. The code designations are defined on Dwg. B1107528, a detail of IEL 7259441.

4.5 Test methods and procedures.

4.5.1 Phosphate coating. – The method of test shall be as specified in the requirements of TT-C-490, as applicable to the type of phosphate used. The prescribed panels shall be processed with the cover or body assemblies to be represented, beginning with the start of daily production and at 4 hour intervals, maximum, thereafter. Appearance and weight of the phosphate coating on the panels shall be recorded against the batch of cover or body assemblies represented.

4.5.2 Paint adhesion. – The method of test shall be as specified in the applicable requirements of TT-C-490. The test shall be performed on three randomly selected surfaces of each unit of the sample.

4.5.3 Corrosion resistance. – The method of test shall be as specified in ASTM B117 - Standard Practice for Operating Salt Spray (FOG) Apparatus. Using a sharp instrument (machinist scribe or equivalent), the painted specimens shall be scribed in a vertical direction approximately 6 to 7 inches long on the flat portion of each side, the bottom, the hinge end, and the cover. The sample shall be positioned so that the hinged edge of the assembled box is elevated approximately 15 degrees from the horizontal and rests upon a wooden support while the cover face is parallel to the principal direction of horizontal flow of fog through the chamber. Traces of paint blistering or corrosion spots on component edges or sharp corners shall not be classed as protective coating failure. After salt spray testing, the scribe shall be evaluated according to ASTM D1654, Procedure A, Methods 1 or 2.

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4.5.4 Gasket compression. – The method of test shall be as specified on Dwg. D11075090, a detail of IEL 7259441, to determine compliance to the requirement.

4.5.5 Airtightness. – The container shall be conditioned to ambient temperature and pressure prior to testing. The containers shall be tested in accordance with 4.5.5.1 or with permission of the procurement agency with 4.5.5.2. A wetting agent may be used to minimize air bubbles clinging to the exterior surface.

4.5.5.1 Vacuum method. – The container shall be tested for leakage by immersing the closed container in the inverted position under water in a vacuum vessel and lower the pressure in the vessel to three pounds per square inch minimum below ambient pressure. Observation for leakage of air from the container interior shall be made for a minimum of 30 seconds after reduction of pressure.

4.5.5.2 Hot Water method. – The container shall be tested for leakage by immersing the closed container, in the inverted position, to a depth of one inch below the surface of the water. The temperature of the water and the length of time of immersion shall be that which will assure an increase in pressure to a minimum of 3 psi above ambient pressure. Observation for air leakage from the container interior shall be made during the period of pressure buildup and for 30 seconds after the 3 psi pressure differential has been reached.

4.5.6 Functioning. – The container shall be inspected to assure compliance with the requirements of 3.7 through the following procedures:

- a. Unlock and lock the cover assembly hardware by hand leverage. Note the locking and unlocking action for effectiveness and ease of operation.
- b. Remove and replace the cover assembly. Note any misfit or bind with the body assembly.
- c. Remove all cover assemblies. Inspect the gaskets for fit, security, cuts, and splits.
- d. Note any sticking of gaskets to the top edges of the body assemblies.
- e. Environmentally condition the container as specified in 3.7.3. After conditioning reinspect the container in accordance with a, b, c, and d, above.

4.5.7 Weld security.

4.5.7.1 Hasp assembly. – The sample body assembly resting on their bottoms shall be clamped in a suitable device. The specified tensional force, utilizing the test fixture (see Dwg. D11075104, a detail of IEL 7259441) for hasp weld security, shall be slowly applied perpendicular to the bottom and against the underside of the offset of the hasp. The force shall be applied at a rate of .125 to .25 inch per minute and held for one minute. After removal of the force, examine the hasp for distortion and weld failure.

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4.5.7.2 Handle assembly. – With the sample body assembly resting on its bottom or on end, attach the test fixture (see Dwg. D11075103, a detail of IEL 7259441) for end handle security to each end handle. With one test fixture securely held, apply the specified tensional force through the other test fixture parallel to the container bottom against the ferrule of each handle. The force shall be applied at a rate of .125 to .25 inch per minute and held for one minute. After removal of the force, examine the handle and hasp for distortion and weld failure.

4.5.7.3 Latch assembly. – Attach test fixture (see Dwg. D11075102, a detail of IEL 7259441) for latch assembly security to each latch on the cover assembly. Secure one test fixture and slowly apply a tensional force to the other parallel to the face of the cover. The force shall be applied at a rate of .125 to .25 inch per minute and held for one minute. The test fixtures apply the force against the surface of the latch links exposed on the underside of each latch. After removal of the force, examine the latches, latch links, latch link retainers and cover for distortion and weld failure.

4.5.8 Flatness.

4.5.8.1 Cover assembly. – The flatness shall be measured on the sample cover assemblies using test equipment (see Dwg. D7259439, a detail of IEL 7259441) along the length of the cover in the area above the cover gasket and the width adjacent to latch link retainer on the flat surface of the cover.

4.5.8.2 Body assembly. – The flatness shall be measured on the sample bodies along the length and width of the top edge using test equipment (see Dwg. D7259440, a detail of IEL 7259441).

5. PACKAGING

5.1 Packaging. – For acquisition purposes, the packaging requirement shall be as specified in the contract or order (see 6.1). 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 requirement. 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 of Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

6.1 Ordering data. – Invitation for bids and contracts or order will specify the following:

6.1.1 Title, number and date of this specification.

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6.1.2 Place of inspection, if not place of manufacture.

6.1.3 First article sample requirements. (See 3.2 and 4.3)

6.1.4 Provisions for the submission and approval of the welding procedure.

6.2 AQL's. – DELETED

6.3 Intermediate point inspection. – The classification of defects identifies the defect characteristics (among other things) for acceptance inspection. It may be necessary to modify the sequence of inspection stations to best suit the manufacturing process. Inspection for defect characteristics which will be hidden or altered by subsequent processing operations (including unrelated operations) should be scheduled to prevent premature acceptance which could be detrimental to the attainment of optimum product quality in the end item.

6.4 Measurement for gasket compression. – Three point contact of the container resting on blocks may be used to overcome any rocking motion which might be encountered with the container resting on the surface plate. However, since the measurement technique relies upon relative distances, care should be taken to assure that there is no displacement on the referenced surfaces between the readings.

6.5 Subject term (key word) listing.

Medium Caliber
Ammunition
Small Caliber

6.6 Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. 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.

Custodians:
Army – AR
Air Force – 99
Navy - SH

Preparing Activity:
Army - AR
(Project 8140-2011-003)

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