

QQ-S-365D  
3 June 1985  
SUPERSEDING  
QQ-S-365C  
August 20, 1979

## FEDERAL SPECIFICATION

### SILVER PLATING, ELECTRODEPOSITED: GENERAL REQUIREMENTS FOR

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration for the use of all Federal Agencies.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the requirements for electrodeposited silver plate (see 6.1).

#### 1.2 Classification.

1.2.1 Types. Silver plating shall be of the following types, as specified (see 3.3.4 and 6.3):

Type I - Matte  
Type II - Semi-bright  
Type III - Bright

1.2.2 Grades. Silver plating shall be of the following grades, as specified (see 3.4.5 and 6.1.3):

Grade A - With supplementary tarnish-resistant treatment  
(chromate treated)

Grade B - Without supplementary tarnish-resistant treatment.

#### 2. APPLICABLE DOCUMENTS

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

##### Federal Specifications:

QQ-S-571 - Solder; Tin Alloy; Lead-Tin Alloy; and Lead Alloy

Area MFFP

DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited.

QQ-S-365D

Federal Standard:

Fed. Test Method Std. No. 151 - Metals; Test Methods

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards, and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.)

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.)

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:

MIL-F 14256 - Flux, Soldering, Liquid (Rosin Base).

Military Standard:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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

American National Standards Institute (ANSI)

B46.1 - Surface Texture

(Application for copies of this standard should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018, or the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.)

QQ-S-365D

American Society for Testing and Materials (ASTM) Standards:

- B 487 - Measuring Metal and Oxide Coating Thicknesses by Microscopical Examination of a Cross Section
- B 499 - Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
- B 504 - Measuring the Thickness of Metallic Coatings by the Coulometric Method
- E 8 - Tension Testing of Metallic Materials

(Application for copies of ASTM standards should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

### 3. REQUIREMENTS

3.1 Materials. The materials used shall produce electrodeposits which meet the requirements of this specification.

#### 3.2 Workmanship.

3.2.1 Basis metal. The surface of the basis metal shall be free from scratches, pits, non-conducting inclusions, and roll and die marks. The surface smoothness of the basis metal shall not affect the appearance or performance of the plating. Articles shall be cleaned, pickled, and plated as required to produce deposits as specified herein. Basis metal defects that are revealed during any of the pretreatments and plating processes shall be cause for rejection of the part.

3.2.2 Silver Plating. The silver plating shall be smooth, fine grained, adherent, free from visible blisters, pits, nodules, porosity, indications of burring, excessive edge build-up and other defects. Superficial staining which has been demonstrated as resulting from rinsing, or slight discolorations from baking to relieve embrittlement from plating, as specified below (see 3.3.3), shall not be cause for rejection. All details of workmanship shall conform to the best practice for high quality plating.

#### 3.3 General requirements.

3.3.1 Plating. Unless otherwise specified, the plating shall be applied after all basis metal heat treatments and mechanical operations such as machining, brazing, welding, forming, and perforating of the article have been completed.

3.3.2 Stress relief treatment. All steel parts shall be given a stress relief heat treatment at a minimum of  $191^{\circ} + 4^{\circ}\text{C}$  ( $375 + 25^{\circ}\text{F}$ ) for 3 hours or more prior to cleaning and plating if they contain or are suspected of having damaging residual tensile stresses caused by machining, grinding, or cold forming operations. Parts which are cold straightened are considered to contain damaging residual stresses. The temperature and time at temperature shall be such that maximum stress relief is obtained without reduction in hardness less than the specified minimum.

## QQ-S-365D

3.3.3 Embrittlement relief. All steel parts having a hardness of Rockwell C40 and above shall be baked at  $375^{\circ} + 25^{\circ}\text{F}$  ( $191^{\circ} + 14^{\circ}\text{C}$ ) for 3 hours or more beginning within four hours after plating to provide embrittlement relief. Plated springs or other parts subject to flexure shall not be flexed prior to the baking operation. The parts when tested in accordance with 4.5.6 shall not crack or fail by fracture.

3.3.4 Type of silver plating. If the type of silver plating is not specified, type I, II, or III will be acceptable.

3.3.5 Suitable undercoat. The final silver deposit shall be preceded by an electrodeposited coating of silver from silver strike solutions. The plating shall be applied over an intermediate coating of nickel or nickel over copper on steel, zinc and zinc-base alloys. Copper and copper base alloys require intermediate coatings. Copper-alloy-basis metal articles on which a nickel undercoat is not used and other basis metal whereon a copper undercoat is employed shall not be used for continuous service at a temperature in excess of  $149^{\circ}\text{C}$  ( $300^{\circ}\text{F}$ ). Adhesion of the silver plating is adversely affected because of the formation by diffusion of a weak eutectic of silver and copper at the silver-copper interface.

3.4 Detail requirements.

3.4.1 Thickness of plating. Unless otherwise specified the minimum plating thickness shall be 0.0005 inch (0.013 mm) on all surfaces on which silver is functionally necessary (for example: appearance, wear, corrosion protection, conductivity). The plating on nonfunctional surfaces and areas shall be of sufficient thickness to ensure plating continuity and uniform utility, appearance, and protection. On ferrous surfaces the total plated thickness shall be not less than 0.0010 inch (0.025 mm). This must be comprised of at least 0.0005 inch (0.013 mm) or more of silver plate over 0.0005 inch (0.013 mm) or less of nickel or copper or any combination thickness of nickel and copper from 0 percent to 100 percent. The copper shall be deposited first over the steel surface.

3.4.2 Adhesion. The adhesion of the silver plating and any undercoat(s) shall be such that when examined at a magnification of approximately four diameters neither the silver plating, nor any electrodeposited undercoat(s), shall show separation from the basis metal or from each other at their common interface(s) when subjected to the test specified in 4.5.2.1. The interface between a plating and the basis metal is the surface of the basis metal before plating. The formation of cracks in the basis metal or plate which do not result in flaking, peeling, or blistering of the plate shall not be considered as nonconformance to this requirement.

3.4.3 Roughness. When a certain degree of surface roughness of the finished article is required, the standards and degree of roughness shall be specified by the procuring activity in accordance with ANSI B46.1. Methods of measuring surface roughness shall be approved by the procuring agency.

3.4.4 Solderability. When specified in the contract or drawings that the part is to be soldered, the silver plate shall be easy to solder according to procedures specified in 4.5.4. The soldered coating shall "wet" evenly without lump formation and shall not flake or peel when the part is tested as specified in 4.5.4.

QQ-S-365D

3.4.5 Tarnish resistance, grade A only. The electrodeposited silver plate shall be made tarnish resistant by treating with a chemical solution (see 6.1.2). The tarnish resistance shall be such that the plating shall withstand the test specified in 4.5.5 for a minimum of five minutes. Lacquer, paint, clear epoxy or other organic coatings shall not be applied to the electrodeposited silver for the purpose of meeting this requirement.

#### 4. QUALITY ASSURANCE PROVISIONS

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

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

- (1) Production control inspection (see 4.3).
- (2) Quality conformance inspection (see 4.4).

#### 4.3 Production control inspection.

4.3.1 Control records. The supplier shall maintain a permanent record of the history of each processing bath, showing all additions of chemicals or treatment materials to the unit, the results of all analyses performed and the quantity of parts of each kind heat treated prior to coating and plated during operation. Upon request of the contracting agency, such records shall be made available to the Government.

4.3.2 Process control. The equipment, procedures and operations employed by a supplier shall be capable of producing high quality electrodeposited silver coatings on alloys as specified in this document. Upon request of the procurement activity, such capability shall be demonstrated by the supplier. Failure to adequately demonstrate this capability will be cause for disapproval of supplier. The tests specified in Table I for process control shall be made prior to production and once each month or more frequently as dictated by the volume, variation in shape, size or complexity of parts being plated or if required by the Government.

QQ-S-365D

TABLE I. Process control tests and specimens

Test	For coating grades	Requirements paragraphs	Specimen preparation paragraphs	Test reference paragraph
Thickness	A,B	3.4.1	4.4.2, 4.4.3, 4.4.4	4.5.1
Adhesion	A,B	3.4.2	4.4.3, 4.4.4	4.5.2
Roughness	A,B	3.4.3	4.4.2	4.5.3
Solderability	A,B	3.4.4	4.4.3, 4.4.4	4.5.4
Tarnish resistance	A	3.4.5	4.4.3, 4.4.4	4.5.5
Hydrogen embrittlement	A,B	3.3.3	4.4.3, 4.5.6	4.5.6

4.4 Quality conformance inspection. Quality conformance inspection and testing of silver plate shall be for the acceptance of individual lots and shall consist of tests for all requirements specified in section 3.

4.4.1 Lot. A lot shall consist of plated articles of the same basis metal composition, type and grade, plated under the same conditions and approximately the same size and shape submitted for inspection at one time. In no case shall the lot exceed production for one week.

4.4.2 Sampling for visual examination and nondestructive tests. Sampling for visual examination and nondestructive tests shall be conducted at the option of the supplier in accordance with MIL-STD-105 or using Table II. A sample of coated parts or articles shall be drawn by taking at random from each lot the number of articles in accordance with MIL-STD-105, acceptable quality Level (AQL) 1.5 percent defective, or as indicated in Table II. The lot shall be accepted or rejected according to the procedures in 4.4.2.1 for visual examination and 4.4.2.2 for plating thickness (nondestructive tests) and roughness. If the number of defective items in any sample exceeds the acceptance number for the specified sample, the lot represented by the sample shall be rejected.

TABLE II. Sampling for visual examination and nondestructive tests

Number of items in lot inspections	Number of items in samples (randomly selected)	Acceptance Number (maximum number of sample items nonconforming to any test)
15 or less	7 <sup>1/</sup>	0
16 to 40	10	0
41 to 110	15	0
111 to 300	25	1
301 to 500	35	1
501 and over	50	2

<sup>1/</sup>If the number of items in the inspection lot is less than 7, the number items in the sample shall equal the number of items in the inspection lot.

QQ-S-365D

4.4.2.1 Visual examination. Samples selected in accordance with 4.4.2 shall be examined for compliance with the requirements of 3.2.1 before plating unless otherwise specified, and 3.2.2 after plating.

4.4.2.2 Thickness of plating (nondestructive tests). Samples selected in accordance with 4.4.2 shall be inspected and the plating thickness measured by the applicable tests in 4.5.1, at several locations on each article as defined in 3.4.1 for compliance with the requirements. The part or article shall be considered nonconforming if one or more measurements fail to meet the specified minimum thickness.

4.4.2.3 Roughness. Samples selected in accordance with 4.4.2 shall be examined for compliance with 3.4.3 when tested as specified in 4.5.3.

4.4.3 Sampling for destructive tests (thickness, adhesion, solderability, tarnish resistance and embrittlement relief). A random sample of four plated parts or articles shall be taken from each lot for each destructive test or separately plated specimens shall be prepared in accordance with 4.4.4 to represent each lot. If the number of articles in the lot is four or less, the number of articles in the sample shall be specified by the procuring activity (see 6.2). Specimens may be used for more than one test where applicable. Failure of one or more of the test specimens shall reject the lot.

4.4.4 Separate specimens. When the plated articles are of such form, shape, size and value as to prohibit use thereof, or are not readily adaptable to a test specified herein, or when destructive tests of small lot sizes are required the test shall be made by the use of separate specimens plated concurrently with the articles represented. The separate specimens shall be of a basis metal equivalent to that of the articles represented. "Equivalent" basis metal includes chemical composition, grade, condition and finish of surface prior to plating. For example, a cold-rolled steel surface should not be used to represent a hot-rolled steel surface. Due to the impracticality of forging or casting separate test specimens, hot-rolled steel specimens may be used to represent forged and cast-steel articles. The separate specimens may be also cut from scrap castings when castings are being plated. These separate specimens shall be introduced into a lot at regular intervals prior to the cleaning operations, preliminary to plating, and shall not be separated therefrom until after completion of plating. Conditions affecting the plating of specimens including the spacing, plating media, bath agitation, temperature, etc. in respect to other objects being plated shall correspond as nearly as possible to those affecting the significant surfaces of the articles represented. Separate specimens shall not be used for thickness measurements, however, unless the necessity for their use has been demonstrated. Separate specimens may be strips approximately 1 inch (25 mm) wide, 4 inches (100 mm) long and 0.04 inch (1 mm) thick except specimens for embrittlement relief shall be prepared as described in 4.5.6.

#### 4.5 Tests.

4.5.1 Thickness. Separate specimens (see 4.4.4) shall not be used for thickness measurements unless a need for such specimens has been shown. Thickness measurements may be made by any suitable method provided the specific method and equipment used shall be such that the coating thickness



QQ-S-365D

will be determined within plus or minus 10 percent of its true thickness. The following test methods for thickness may be used as applicable: ASTM B487 (microscopic), ASTM B 504 (coulometric), ASTM B 499 (magnetic), beta radiation backscatter, or X-ray spectrometry. Measurements on threaded fasteners shall be made on the shank or other smooth surface as close to the threads as possible.

4.5.1.1 Nondestructive tests for thickness. Each item in the sample selected to accordance with 4.4.2.2 shall be measured for plating thickness. The measurements shall be made in several representative locations on each item and the item shall be considered defective if one or more of the measurements fail to meet the specified minimum thickness.

4.5.1.2 Destructive tests for thickness. Each item selected in accordance with 4.4.3 shall be tested in several locations by one of the destructive test methods for thickness. If the plating thickness at any one place on any one item is less than the specified minimum, the lot shall be rejected.

4.5.2 Adhesion. Each item selected in accordance with 4.4.3 shall be tested for adhesion. The items used for the thickness test of 4.5.1 shall be used for the adhesion test if the items are of suitable size and form. When specified (see 6.2), an alternate adhesion test may be used.

4.5.2.1 Method of test. The test specimens shall be bent repeatedly through an angle of 180° on a diameter equal to the thickness of the specimen until fracture of the basis metal occurs. Following fracture of the basis metal, it shall not be possible to detach any areas of the coatings with a sharp instrument. When the plated articles are not readily adaptable to the bend test, adhesion may be determined on the plated article by cutting the plating from the basis metal at the interface(s) in a continuous path, and examining at four diameters magnification to determine whether removal has been caused by the cutting away of an adherent plate or by the lifting of a non-adherent plate. At the option of the procuring agency, an alternate adhesion test may be used. In this test, parts are placed in an oven and heated at 150° to 200°C (300° to 392°F). This temperature shall be maintained long enough to bring the items to temperature and then continued for 30 minutes. The test specimens shall be removed, cooled in air and examined at four diameters magnification for evidence of blistering of the silver deposit. Any blistering constitutes failure of the specimen. The quench test for adhesion may have an adverse effect on mechanical properties of the articles being tested.

4.5.3 Roughness. Each item selected in accordance with 4.4.2 shall be measured for the specified degree of roughness. Measurements shall be made at several locations on each item. Measurements shall be made by techniques approved by the procuring agency in accordance with ANSI Method B46.1. The item shall be considered defective if one or more of the measurements fail to meet the roughness requirement. If the number of nonconforming items equals or exceeds the rejection number for that sample, the lot shall be rejected.

4.5.4 Solderability. Each item in the sample of 4.4.3 shall be tested for solderability. The items used for the thickness and adhesion tests of 4.5.1 and 4.5.2 may be used for the solderability test if the items are of suitable size and form. Failure of one or more of the test specimens shall reject the lot.



## QQ-S-365D

4.5.4.1 Method of test. Test specimens shall be suitably fluxed with non-corrosive rosin flux conforming to ASTM B 678, type R. The solder shall be an alloy of 60% tin and 40% lead conforming to alloy Grade 60A of ASTM B 32. The temperature of the solder shall be  $245^{\circ} \pm 5^{\circ}\text{C}$  ( $473^{\circ} \pm 9^{\circ}\text{F}$ ).

4.5.5 Tarnish resistance (grade A only). Each item selected in accordance with 4.4.3 shall be tested for tarnish resistance. Failure of one or more of the test specimens shall reject the lot.

4.5.5.1 Method of test. Pipette one ml of 20 to 24 percent ammonium sulfide (light), reagent grade, into a one-liter volumetric flask. Fill to the mark with distilled water and agitate thoroughly. Place one drop of the solution on a specimen without tarnish resistant coating (grade B) and one drop on a specimen with supplementary tarnish-resistant-chromate treatment (grade A). The drop on the grade B specimen should begin to show a black or brown color in about one minute. The treated specimen shall conform to the requirements of 3.4.5.

4.5.6 Embrittlement relief test for steel parts (see 3.3.3).

4.5.6.1 Preproduction process qualification test for embrittlement (destructive tests). Four round notched steel specimens, with the axis of the specimen (load direction) perpendicular to the short transverse grain flow direction shall be selected from four individual heats (total of sixteen specimens). These specimens shall be prepared using the specific steel alloy for which preproduction qualification of the process is to be demonstrated. They shall be heat treated to the maximum tensile strength range representing production usage. The configuration shall be in accordance with figure 8 of ASTM E 8 for round specimens. Specimens shall have a 60-degree V-notch located approximately at the center of the gage length. The cross section area at the root of the Vee shall be approximately equal to half the area of the full cross section of the specimen's reduced section. The Vee shall have a  $0.0100$  inch ( $0.25$  mm)  $\pm 0.0005$  inch ( $0.013$  mm) radius of curvature at the base of the notch. The specimens shall be given the same pretreatments, electroplating and post plating treatments in accordance with the process proposed for production. The specimens shall be subjected to a sustained tensile load equal to 75 percent of the ultimate notch tensile strength of the unplated material for a minimum of 200 hours (see 6.2.1). The process shall be considered satisfactory if all specimens show no indication of cracks or failure. The test results and process control information shall be submitted to the procuring activity for approval. Until approval has been received, parts shall not be plated.

QQ-S-365D

4.5.6.2 Production process control test for embrittlement (destructive tests). To assure adequacy of the procedures and operations employed for continuous production of high quality plating, four round notched steel specimens shall be prepared and tested as detailed in 4.5.6.1. Specimens may be from one or more heats. The results of tests made to determine conformance to definite contracts or purchase orders are acceptable as evidence of the properties being obtained during production.

4.5.7 Workmanship. Each item selected in accordance with 4.4.2 shall be examined for compliance with each of the requirements of 3.2.2. If the number of nonconforming items equals or exceeds the rejection number for that sample, the lot shall be rejected.

#### 4.6 Rejection.

4.6.1 Rejection by visual inspection, nondestructive thickness tests and roughness tests. Any item in the sample having one or more defects shall be rejected and if the number of defective items exceeds the acceptance number for that sample as specified in 4.4.2, the lot represented by the sample shall be rejected.

4.6.2 Rejection by adhesion, destructive thickness, solderability, tarnish resistance and embrittlement relief tests. If any item in the sample selected in accordance with 4.4.3 fails the requirement for either adhesion, thickness, solderability, tarnish resistance or embrittlement tests, the lot shall be rejected.

### 5. PACKAGING

5.1 Packaging, packing, and marking requirements are not applicable to this specification (see 6.4).

### 6. NOTES

6.1 Intended use. The following applications of various thicknesses of coating are submitted for informative purposes only and are not to be construed as mandatory requirements in the use of this specification.

- 0.0003" (0.008mm) - for articles such as terminals which are to be soldered
- 0.0005" (0.013mm) - for corrosion protection of nonferrous basis metals
- 0.005-0.010"  
(0.013-0.25mm) - for electrical contacts, depending on pressure, friction and electrical load
- 0.0005" (0.013mm) - for increasing the electrical conductivity of basis metals

6.1.1 For applications wherein corrosion protection is important, the use of an electrodeposited nickel undercoat will be advantageous.

## QQ-S-365D

6.1.2 Grade A silver plating with tarnish-resistant coating when produced using chromate-type supplementary dips have a low contact resistance in the order of 300 to 400 microhms per square inch (0.5 to 0.6 microhms per square mm). The items must be solderable with rosin cored solder.

6.1.3 The dimensional tolerance of most threaded articles, such as nuts, bolts, screws and similar fasteners with complimentary threads, normally does not permit the application of coating thickness much greater than 0.00015 inch (0.004 mm). The limitations of coating thickness on threaded fasteners imposed by dimensional tolerances (including class or fit) should be a subject for consideration wherever practicable, both by the manufacturer and the purchaser, to prevent the application of greater coating thicknesses than are generally permissible. If heavier coatings are required for satisfactory corrosion resistance, allowances must be made in the manufacture of threaded fasteners for the tolerance necessary for plate build-up.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, symbol, and date of this specification.
- (b) Type and grade of plating (see 1.2 and 6.3).
- (c) Thickness, if other than specified (see 3.4.1)
- (d) Surface roughness, if necessary (see 3.4.3).
- (e) Solderability requirement, if necessary (see 3.4.4).
- (f) Place of inspection and test.
- (g) Methods of roughness and thickness measurements (see 4.5.3 and 4.5.1).
- (h) Alternate adhesion test, if required (see 4.5.2.1)
- (i) Packaging data (see 6.4).
- (j) Embrittlement relief (see 3.3.3 and 4.5.6).
- (k) Suitable undercoat (see 3.3.5).

6.2.1 The manufacturer of the basis metal parts must provide the plating facility with the following data:

- (a) Hardness of steel parts (see 3.3.3).
- (b) Heat treatment for stress relief; whether has been performed or is required (see 3.3.2).
- (c) Tensile loads required for embrittlement relief test, if applicable (see 4.5.6).

6.2.2 The manufacturer of the basis metal parts should provide the plating facility with notched tensile specimens (see 4.5.6) to be plated for conformance to 3.3.3 as required for production control (see 4.5.6.1) and lot acceptance (see 4.5.6.2).

QQ-S-365D

6.3 Definition of types. For the purpose of this specification, matte (type I), semi-bright (type II), and bright (type III) deposits are defined as follows:

- (a) Matte. Deposits without luster comparable to those normally obtained from a silver-cyanide plating solutions operated without the use of brighteners.
- (b) Semi-bright. Semi-lustrous deposits comparable to those normally obtained from silver-cyanide plating solutions operated with brighteners.
- (c) Bright. Sometimes obtained by polishing or by use of "brighteners".

6.3.1 Should the procuring agency desire a more specific requirement for luster or brightness the procuring agency should furnish the manufacturer with a suitable reference standard.

6.4 Packing information. If it is desired that the silver (grade B) remain in an untarnished state, the packaging of silver should be sufficiently tight to prevent the entrance of sulfur-bearing atmospheres. Since cardboard or chipboard containers, newspapers, and other paper stock ordinarily contain sufficient sulfur in a form to cause tarnishing of silver, packing materials, especially produced for silver, should be employed; or the packing material may be selected according to the following test:

A sample of the packing material in contact with silver-plated parts (grade B) is placed in a clean glass-stoppered bottle and heated in an oven at some elevated temperature such as 100°C (212°F) for approximately 24 hours. If the packing material is free of sulfiding sulfur compounds, there will be little or no tarnishing of the silver plated parts in contact with the packing material. An antitarnish packaging material is described in NNN-P-40.

MILITARY CUSTODIANS:

Army - MR  
Navy - SH

Preparing activity:

Army - MR

CIVIL AGENCIES INTEREST:

GSA - FSS

Review Activities:

Army - AR, MI,  
Navy - AS, OS, EC  
DSA - IS

User interest:

Army - AT, IH

(KBWP# ID-0521A/DISK 0110A. FOR AMMRC USE ONLY)