

INCH-POUND

MIL-P-47226A (MI)  
30 March 1992  
SUPERSEDING  
MIL-P-47226 (MI)  
12 July 1974

## MILITARY SPECIFICATION

### PLATING, COPPER, ELECTROLESS (FOR NON-CONDUCTING MATERIAL)

This specification is approved for use by the U.S. Army Missile 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 specification covers the requirements for chemically-deposited conductive copper films used to coat electrically non-conducting materials.

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Missile Command, ATTN: AMSMI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5270 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A  
DISTRIBUTION STATEMENT A.  
distribution is unlimited.

FSC 95GP  
Approved for public release;

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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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

## SPECIFICATIONS

## FEDERAL

A-A-113 - Tape, Pressure-Sensitive Adhesive

## MILITARY

MIL-C-14550 - Copper Plating (Electrodeposited)

(Unless otherwise indicated, copies of the federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Ave., Philadelphia, PA 19111-5094.)

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

## 3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.4.

3.2 Material. The electroless copper film shall consist of a homogeneous coating of 99 percent copper produced by chemical reduction in a water solution of complexed copper ions.

3.3 Adhesion to substrate. The electroless copper film shall adhere, without lifting or scaling, to a suitably deglazed and chemically prepared substrate (see 4.5.1 and 4.6.2).

3.4 Workmanship. The electroless copper film shall be free of blisters and voids (see 4.6.1).

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## 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

- a. First article inspection (see 4.4)
- b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed under conditions of room ambient pressure, temperature and humidity.

4.3.1 Inspection lot. An inspection lot shall consist of plated parts of the same type, plated under similar conditions, and submitted for inspection at one time.

4.3.2 Inspection equipment and facilities. Inspection equipment shall be of adequate quality and quantity to permit performance of the required examinations and tests, and shall comply with the equipment described in the applicable inspection

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methods of this specification and the documents specified herein. Inspection facilities shall be adequate to permit performance of the required inspection.

4.4 First article inspection. When specified in the contract or order (see 6.2), a first article sample shall be subjected to first article inspection. Subsequent units shall not be considered for acceptance until Government approval of the first article sample has been obtained (see 3.1 and 4.2).

4.5 Quality conformance inspection. Quality conformance inspections shall be as specified in table I (see 4.2).

TABLE I. Quality conformance inspection.

Examination or test	Requirement paragraph	Test paragraph
Adhesion to substrate	3.3	4.6.2
Workmanship	3.4	4.6.1

4.5.1 Test specimens. Three test specimens not less than 0.04 x 1 x 4 inches shall be prepared from a material equivalent to that of the parts represented. Equivalency shall include chemical composition, condition, temperature treatment, and surface finish prior to plating. The specimens shall be integrated into the lot prior to the cleaning and other surface-preparation operations required before plating and shall not be separated therefrom until after completion of processing. The specimens shall be coated with electroless copper film, and electroplated with copper in accordance with MIL-C-14550, concurrently with the parts represented. These specimens shall be subjected to the tests specified in table I (see 4.5).

4.5.2 Rejection. The lot represented by the specimens shall be rejected if a failure occurs. The supplier shall take appropriate corrective action as necessary on all parts plated under essentially the same conditions and which are considered subject to the same type of failure. Acceptance of further lots shall be withheld until three specimens which incorporate the corrective action have been subjected to and passed the quality conformance inspection (see 4.5).

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4.6 Inspection methods.

4.6.1 Visual examination for workmanship. The plating shall be examined under 10 magnification for compliance with requirements specified in 3.4.

4.6.2 Test for adhesion to substrate. A sharp knife shall be used to cut a 0.50 x 0.75 inch rectangle through the plating on the test specimens. A strip of cellophane tape, 0.50 inch wide x 2 inches long, conforming to A-A-113, shall be pressed firmly across the rectangular cut on the surface of the copper plating. The tape shall be removed quickly by hand, approximately perpendicular to the surface. Compliance with requirements specified in 3.3 shall be noted.

5. PACKAGING

This section is not applicable to this specification.

6. NOTES

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

6.1 Intended use. The conductive copper film covered by this specification is intended for use in coating electrically non-conductive materials for the purpose of subsequent electroplating.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1)
- c. When first article is required (see 3.1 and 4.4).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerers whether the item(s) should be a first article sample, a first production item, or a number of items to be tested as specified in 4.4. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and

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disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 Metrication. Metric equivalents in accordance with FED-STD-376 are acceptable for use in this specification.

6.5 Subject term (key word) listing.

Coating  
Cladding  
Electrocoating  
Finishes, metal  
Metallizing  
Plate

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

Custodian:  
Army - MI

Preparing Activity:  
Army - MI

Project No. 95GP-A024

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

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

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

<b>I RECOMMEND A CHANGE</b>	1. DOCUMENT NUMBER MIL-P-47226A (MI)	2. DOCUMENT DATE (YYMMDD) 920330
3. DOCUMENT TITLE PLATING, COPPER, ELECTROLESS (FOR NON-CONDUCTING MATERIAL)		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
<b>A. SUBMITTER</b>		
1. NAME (Last, First, Middle Initial)	2. ORGANIZATION	
3. ADDRESS (Include Zip Code)	4. TELEPHONE (Include Area Code) (1) Commercial 2) AUTOVON (If applicable)	5. DATE SUBMITTED (YYMMDD)
<b>B. PREPARING ACTIVITY</b>		
a. NAME COMMANDER U.S. ARMY MISSILE COMMAND	b. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (205) 876-6980 746-6980	
c. ADDRESS (Include Zip Code) ATTN: AMSMI-RD-SE-TD-ST REDSTONE ARSENAL, AL 35898-5270	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	

