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SUPERSEDING
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MILITARY SPECIFICATION

STEEL, COPPER ALLOY CLAD; STRIP
(for Small Caliber Bullet Jackets)

1. SCOPE

1.1 This specification covers annealed copper alloy clad steel strip for small caliber bullet jacket cups.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

MILITARY

MIL-C-3993 - Copper and Copper Base Alloy Mill Products, Packaging of
MIL-C-21768 - Copper Alloy Numbers 210 (Gilding, 95%) and 220 (Commercial Bronze, 90%) Sheet and Strip

STANDARDS

FEDERAL

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

FSC 1305

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-109 - Quality Assurance Terms and Definitions
MIL-STD-129 - Marking for Shipment and Storage

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Chemical composition.

3.1.1 Copper alloy. The composition of the copper alloy cladding shall conform to the requirements of MIL-C-21768, copper alloy No. 220.

3.1.2 Steel. The composition of the steel shall conform to the requirements specified in table I.

Table I. Chemical composition of steel

Elements	Percent
Carbon, max.	0.13
Manganese	.25-0.60
Silicon, max.	.07
Phosphorus, max.	.05
Sulphur, max.	.06

3.2 The steel shall be rimmed or semi-killed with aluminum.

3.3 Mechanical properties.

3.3.1 Hardness. The hardness of the steel core shall not exceed Rockwell B60 or Rockwell 30T 56.5.

3.4 Dimensional tolerances of clad steel strip.

3.4.1 The thickness, width and permissible variations therein of clad steel strip shall be as specified in the invitation for bids, in the contract or purchase order. The strip shall be furnished with a No. 3 edge (slit).

3.4.2 The maximum permissible camber of strip shall be as specified in the contract. (See 6.2).

3.4.3 The thickness of the copper alloy cladding shall meet the requirements shown in table II.

Table II. Thickness of copper alloy cladding, min.

One side	15 percent of entire thickness of strip
Other side	5 percent of entire thickness of strip

3.5 Workmanship.

3.5.1 The copper alloy cladding on the strip shall be continuous and completely bonded to both sides of the steel core.

3.5.2 The steel core and the cladding each shall be of uniform quality, composition and hardness.

3.5.2.1 Metal defects. The steel core and cladding each shall be free of laminations, pipes, slivers, laps, cracks, scratches, wrinkles, scale, dents, bent edges, kinks and warps.

3.5.2.2 Foreign matter. The strip shall be clean and free from acid, oil, grease, oxidation, dirt, grit, stains and chips.

3.6 Work test. The material shall draw to the required shape without developing any defect which will cause it to be unsuitable for the purpose intended. Work test shall include all operations utilized in the manufacture of bullets jacketed with copper alloy clad steel.

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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 that supplies and services conform to prescribed requirements.

4.1.1 Quality assurance terms and definitions. Reference shall be made to MIL-STD-109 to define quality assurance terms used.

4.2 Sampling. Unless otherwise specified, and when applicable, the sampling plan and procedures used by the inspector in the determination of the acceptability of the product submitted by a supplier for inspection will be in accordance with provisions of MIL-STD-105.

4.3 Lot. Unless otherwise specified, a lot shall consist of 10,000 pounds of clad strip with the steel core from the same heat or melt of steel, of the same nominal thickness and width, submitted for inspection at one time.

4.4 Gaging. At least 5 percent of the cut lengths or coils from each lot shall be selected and gaged for thickness and width.

4.5 Preparation for shipment. Examination of the packing and marking for shipment shall be made for conformance to the requirements of section 5.

4.6 Test procedures.

4.6.1 Thickness of cladding. The thickness of the cladding shall be determined by one of the following or such other methods as approved by the contracting officer:

(a) Microscopic examination of a suitable cross section.

(b) Stripping the coating from a measured area and determining the loss in weight. (When the stripping method is used, the following procedure shall be used: A sample of the clad strip 1 by 1 inch shall be weighed and then dissolved in a solution consisting of 500 grams per liter of chromic acid and 50 grams per liter of sulfuric acid at a temperature of 180°F to 212°F until a constant weight is obtained. Calculate for thickness of the cladding.) Care shall be exercised so that the cladding is removed from only one side at a time to determine conformance with 3.4.3.

(c) A magnetic method. (When a magnetic method is used, the accuracy of the instrument shall be checked against certified plates at least once a day.)

4.6.1.1 In case of dispute, the microscopic method shall be used.

4.6.2 Hardness test. The Rockwell B hardness of the steel core, after removal of the gilding metal cladding, shall be determined every 4 inches along a diagonal of the surface of each sample selected for test. Hardness tests shall be conducted in accordance with method 243 of Fed. Test Method Std. No. 151.

4.6.3 Work test. At least 1 percent by weight of the material in each lot shall be submitted to a work test comprising all operations used in the manufacture of bullets jacketed with gilding metal clad steel.

4.6.4 Chemical analysis. The samples shall be analyzed in accordance with method 111 or method 112 of Fed. Test Method Std. No. 151 to determine conformance with 3.1. A single analysis of a composite sample may be made. In case of dispute, analysis in accordance with method 111 of Fed. Test Method Std. No. 151 shall be the basis for acceptance.

4.7 Rejection.

4.7.1 Examination defects. Any sample unit having one or more defects shall be rejected. If the number of nonconforming sample units in the sample exceeds the acceptance number specified for that sample size, the entire lot shall be rejected subject to the provisions of the section on "Disposition of Non-Conforming Product" of MIL-STD-105.

4.7.2 Test failures. A lot shall be rejected for failure to meet any of the test requirements when tested in accordance with 4.6 subject to the provisions of the section on "Rejection and Retests" of Fed. Test Method Std. No. 151.

5. PREPARATION FOR DELIVERY

5.1 Packing (See 6.3).

5.1.1 Levels A and B. The material shall be packed in accordance with MIL-C-3993.

5.1.2 Level C. The products shall be separated by size and packed for shipment in compliance with common carrier regulations applicable to that mode of transportation to insure safe delivery at destination at lowest transportation costs without assessment of penalty charges for improper packing.

5.2 Marking. In addition to any special marking required in the contract or order (see 6.2) marking for shipment shall be in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. Material covered by this specification is used in cups for small arms ammunition bullet jackets.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number and date of this specification.

(b) Flat lengths or coils. The side of the strip having the greater thickness of copper alloy cladding shall be identified by stamping or other suitable method. When coils are specified, the side of the strip having the greater thickness of cladding shall be on the inside of the coil.

(c) Coil arbor size and outside diameter.

(d) When tolerances are required, all plus or all minus.

(e) Maximum permissible camber of strip (see 3.4.2).

(f) Nature of application of the material, such as spinning or cupping.

(g) Procedure for resubmission of rejected lots.

(h) When a lot size other than 10,000 pounds is required.

(i) Whether material is to be packed by level A, B, or C (see 5.1).

(j) Maximum gross weight of containers with contents.

(k) Special marking, if required (see 5.2).

(l) Details of work test.

6.3 The requirements for item identification marking and for packing and marking for shipments (see 5.1 and 5.2) specified herein apply to direct shipment for Government activities and apply also where specified to contracts or orders between the manufacturer and the Government prime contractor.

6.4 Definition of strip. Strip, as covered by this specification, is a flat product, other than flat wire, up to and including 0.188 inch in thickness, and generally furnished with commercial No. 3 slit edge with widths over 1 1/4 inch to 20 inches, inclusive.

Custodian:
Army - MU

Preparing activity:
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Review activities:
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