

INCH-POUND

MIL-DTL-55422B
11 August 2011
SUPERSEDING
MIL-DTL-55422A
15 December 2001

DETAIL SPECIFICATION

CLIP, ELECTRICAL, GRID AND ANODE, GENERAL SPECIFICATION FOR

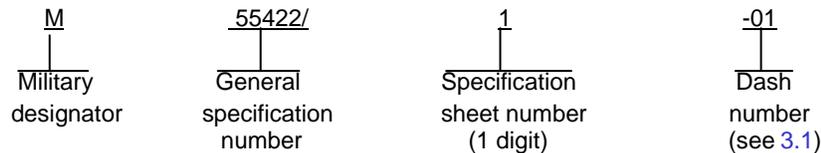
This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the general requirements for grid and anode types of electrical clips for electron tubes.

1.2 Classification.

1.2.1 Part or identifying Number (PIN). PINs to be used for clip acquired to this specification are created as follows:



2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in [sections 3](#) and [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.

2.2 Government documents.

2.2.1 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.

Comments, suggestions or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990, or emailed to relay@dla.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.daps.dla.mil>.

COMMERCIAL ITEM DESCRIPTION

[A-A-59588](#) - Rubber, Silicone.

DEPARTMENT OF DEFENSE SPECIFICATIONS

[MIL-DTL-16878](#) - Wire, Electrical, Insulated, General Specification for.

[MIL-DTL-55422/1](#) - Clip, Electrical, Grid.

DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-129](#) - Military Marking for Shipment and Storage.

[MIL-STD-202](#) - Electronic and Electrical Components Parts.

[MIL-STD-810](#) - Environmental Engineering Considerations and Laboratory Tests.

[MIL-STD-889](#) - Dissimilar Metals.

[MIL-STD-1285](#) - Marking of Electrical and Electronic Parts.

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

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 are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM International)

[ASTM B194](#) - Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar.

[ASTM B545](#) - Electrodeposited Coatings of Tin.

(Application for copies can be made online at <http://www.astm.org> or from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE International)

[SAE-AMS-QQ-P-416](#) - Plating Cadmium (Electrodeposited).

(Applications for copies can be made online at <http://www.sae.org> or from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 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 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between requirements of this specification and specification sheet, the latter shall govern.

3.2 Material. The material for each part shall be as specified (see 3.1). When a definite material is not specified, a material that will enable the clips to meet the requirements of this specification shall be used. Acceptance or approval of a constituent material shall not be construed as a guarantee of the acceptance of the finished product. Materials shall be non-nutrient to fungus growth. Submission of certification that materials used are non-nutrient to fungus growth will be considered compliance with this requirement without testing. If certification is not furnished, clips shall be subjected to the fungus-resistance test of method 508, procedure I, of MIL-STD-810.

3.2.1 Ceramic. Ceramic material shall conform to requirements in table I or better.

TABLE I. Ceramic requirements.

Dielectric constant	12 or under
Dielectric loss index at 1 MHz	.016 maximum
Dielectric strength average	200 to 249, inclusive
Flexural strength (modulus of rupture)	12,000 to 19,000 inclusive

3.2.2 Metals.

3.2.2.1 Beryllium-copper alloy. Beryllium-copper alloy shall conform to ASTM B194 and shall be suitably heat treated after forming and prior to cleaning and plating.

3.2.3 Silicone rubber. Silicone rubber shall conform to class 3B of A-A-59588.

3.2.4 Corrosion-resistance. The clips shall be fabricated of a corrosion-resistant material or be treated to prevent corrosion formation.

3.3 Design and construction. The clips shall be of the material, design, construction, and physical dimensions specified (see 3.1).

3.4 Finish. Finish shall be electro-tin plate as specified in ASTM B545. The clips shall be plated so that before and after the environmental tests specified herein, there shall be evidence of peeling, cracking, or corrosion. Unless specifically approved by the acquiring activity, no additional insulating material shall be applied.

3.4.1 Cadmium plating. Cadmium plating shall conform to class 2, type II of SAE AMS QQ-P-416.

3.5 Dissimilar metals. When dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided. The use of dissimilar metals which, in contact, tend toward active electrolytic corrosion (particularly brass, copper, or steel used in metals) shall be as specified in MIL-STD-889.

3.6 Salt spray (corrosion). When clips are tested as specified in 4.5.2.1, the base metal shall show no evidence of corrosion on blistering of plated surfaces.

3.7 Vibration. When tested as specified in 4.5.2.2, the clip shall display no evidence of cracking, breaking, loosening of parts, wear or damage to the clip, nor loss of electrical continuity of the contact circuit for a period greater than 10 microseconds.

3.8 Thermal shock. When tested as specified in 4.5.2.3, the clip shall retain a force on the test plug of not less than 80 percent as measured before the test. There shall be no cracking or chipping of the ceramic insulated clips.

3.9 Shock. When tested as specified in 4.5.2.4, there shall be no evidence of mechanical damage to the clip. The clip shall retain a force on the test plug of not less than 80 percent as measured before the test.

3.10 Retaining and release force. When clips are tested as specified in 4.5.2.5, the force required to couple and uncouple the clip shall be within the limits specified (see 3.1).

3.11 Dielectric withstanding voltage. When clips are tested as specified in 4.5.2.6, there shall be no evidence of damage, arcing, or breakdown.

3.12 Cleaning and drying. Gaskets shall be cleaned and dried by any suitable process or processes that are not injurious to the item.

3.13 Identification marking. The clips shall be legibly and durably marked with the Part or Identifying Number (PIN) and the manufacturer's identification in accordance with MIL-STD-1285.

3.14 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 maintenance requirements, and promotes economically advantageous life cycle costs.

3.15 Pure tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of clip and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.3).

3.16 Workmanship. The clips shall show no evidence of cracks, fissures, peeling, or chipping of the plating or finish. When examined (see 4.4.1), there shall be no evidence of poor molding, poor fabrication techniques, or foreign material.

4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.4).

4.2 First article inspection. Component-materials inspection shall consist of verification that the component materials listed in table II fabricating the electrical clips are in accordance with the applicable referenced specifications or requirements prior to such fabrication.

TABLE II. First article inspection.

Component material	Requirement paragraph
Insulation:	
Ceramic	3.2.1
Silicone rubber	3.2.3
Metals:	
Beryllium-copper alloy	3.2.2.1
Finish:	
Tin plating	3.4

4.3 Inspection conditions. Unless otherwise specified herein, test conditions shall be as specified in MIL-STD-202.

4.4 Conformance inspection.

4.4.1 In-process inspection. Inspection of product for delivery shall consist of groups A and B. Sampling plans and procedures for inspection shall be as specified in table III.

4.4.1.1 Inspection lot. An inspection lot shall consist of all the clips of the same material, configuration, and dimensions, manufactured under essentially the same conditions and submitted for conformance inspection and testing at one time.

4.4.1.2 Rejected lots. If an inspection lot is rejected, the supplier may withdraw the lot, rework it to correct the defects, or screen out defective units, as applicable, and reinspect. Such lots shall be separated from new lots and shall be clearly identified as reinspected lots. Rejected lots shall be inspected using tightened inspection.

4.4.1.3 Group A inspection. Group A inspection shall consist of the inspections in 4.5.1 with the sample sizes of table III.

TABLE III. Group A inspection.

Lot size	Inspection of product
2 to 8	100 percent
9 to 15	13
16 to 25	13
26 to 50	13
51 to 90	13
91 to 150	13
151 to 280	20
281 to 500	29
501 to 1,200	34
1,201 to 3,200	42
3,201 to 10,000	50
10,001 to 35,000	60
35,001 to 150,000	74
150,001 to 500,000	90
500,000 and over	102

4.4.1.3.1 Disposition of sample units Sample units which have been subjected to group A inspection shall be delivered on the contract or order.

4.4.1.4 Group B inspection. Group B inspection shall consist of the tests specified in table IV in the order shown.

TABLE IV. Group B inspection.

Test	Requirement paragraph	Method paragraph
Group I		
Vibration	3.7	4.5.2.2
Thermal shock	3.8	4.5.2.3
Shock	3.9	4.5.2.4
Retaining and release force	3.10	4.5.2.5
Group II		
Dielectric withstanding voltage	3.11	4.5.2.6
Salt spray	3.6	4.5.2.1

4.4.1.4.1 Sampling plan. Each year six sample units shall be selected from the first lot and divided into two subgroups of three each. No failures shall be allowed. Group B inspection shall be performed on sample units that have passed group A inspection, unless the Government considers it more practical to select a separate sample from the lot for group B inspection.

4.4.1.4.2 Disposition of sample units. Sample units which have been subjected to group B inspection shall not be delivered on the contract or order.

4.5 Methods of inspection.

4.5.1 Inspection of product. Clips shall be examined for compliance with applicable design, construction, physical dimensions, marking, and workmanship requirements (see 3.1, 3.13, and 3.16).

4.5.2 Test procedures.

4.5.2.1 Salt spray (corrosion) (see 3.6). Sample clips shall be tested in accordance with MIL-STD-202, method 101, condition A. Salt concentration shall be 5 percent. After the test, the clips shall be examined for exposure of base metal or blistering of the plated surface.

4.5.2.2 Vibration, high frequency (see 3.7). Clips shall be tested in accordance with MIL-STD-202, method 204, and with the following exceptions and details:

- a. Specimens shall be mounted in a normal manner to a test plug which shall be fastened to the vibration machine. The clip shall be mated to the plug or tube without the use of safety wire or other supplementary locking devices. The lead wire shall be supported by a stationary frame not closer than 12 inches (30.48 cm) from the mated clip and tube cap or test plug. The wire shall conform to MIL-DTL-16878.
- b. Test condition letter D.
- c. The clips shall be wired and current allowed to flow at the maximum operating rated voltage and current of the tube with which the clip mates.

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- d. The vibration shall be conducted in each of three mutually perpendicular directions at the following temperature conditions:
 - (1) -65°C: 25 percent of the time.
 - (2) +265°C: 25 percent of the time.
 - (3) Normal temperature conditions: 50 percent of the time.
- e. The circuit shall be monitored for circuit continuity before, during, and after the vibration. A discontinuity of contact or interruption of current flow for more than ten microseconds shall not be allowed.

4.5.2.3 Thermal shock. Clips shall be tested in accordance with [MIL-STD-202](#), method 107, test condition C, and shall meet the requirements of [3.8](#).

4.5.2.4 Shock (see 3.9). Clips shall be tested in accordance with method 202 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Mounting of specimens. By their normal mounting means with the test plug fastened to the shock machine and the clip coupled to the test plug.
- b. Acceleration. 50 gravity units.
- c. Number of blows. Four
- d. Direction of blows. One direction shall be in the axis of the test plug, away from the open end of the clip, and the other direction shall be perpendicular to the axis of the test plug.
- e. Measurements before and after shock. Clips shall be removed from the test plug parts and the withdrawal force recorded.

4.5.2.5 Retaining and release force for electrical clips (see 3.10). The clips shall be rigidly mounted so as to permit coupling and uncoupling of the test plugs. The force to couple and uncouple the clips on the maximum size test plug shall be within the limits specified (see [3.1](#)). The clip shall be coupled and uncoupled 500 times. The maximum size test plug shall have a diameter of no less than the tube cap diameter of +.015 inches (0.38 mm). A minimum size test plug shall be inserted, and the gradually applied release force shall be measured. This force shall be as specified by the retaining and release force of the specification sheets. The minimum size test plug shall have a diameter of no more than the tube cap diameter, .007 inches (0.18 mm).

4.5.2.6 Dielectric withstanding voltage (see 3.11). Clips shall be tested in accordance with method 301 of [MIL-STD-202](#). The following details and exceptions shall apply:

- a. Special preparation or conditions:
 - (1) The maximum relative humidity shall be 50 percent.
 - (2) The center of contact of the clips shall be positioned in such a manner as to simulate actual assembly conditions.
 - (3) Precautions shall be taken to prevent air gap voltage breakdown.

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- b. Magnitude of test voltage: 3,500 volts (RMS) at sea level; 1,500 volts (RMS) at 50,000 feet; 750 volts (RMS) at 70,000 feet. Voltage shall be applied instantaneously.
- c. Nature of potential: Alternating current.
- d. Points of application of test voltage: As specified on figure in specification sheets.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. 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's 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.

6.1.1 General. Electrical clips covered by this specification are designed for the use with electron tubes. Their principal areas of application are aircraft, missiles, spacecraft, and ground support equipment. This does not preclude the use of these clips in other military applications.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.

6.2.1 Items covered by specification sheets. Acquisition documents for gaskets covered by MIL-DTL-55422 specification sheets should specify the following:

- a. Title, number, and date of this specification.
- b. Title, number, and date of the applicable specification sheet and the complete PIN (see 1.2.1 and 3.1).
- c. Special or additional marking (if required) (see 5.1).

6.3 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to [ASTM-B545](#) (Standard Specification for Electrodeposited Coatings of Tin).

6.4 PIN. This specification requires a PIN that describes codification or classification and appropriate references to associated documents (see 1.2 and 3.1).

6.5 Subject term (key word) listing.

Beryllium
Beryllium copper

6.6 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmentally Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website at <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Included in the list of 31 priority chemicals are cadmium, lead, and mercury. Use of the materials on the list should be minimized or eliminated unless needed to meet the requirements specified herein (see [section 3](#)).

6.7 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 last previous issue.

Custodians:
Army - CR
Navy - SH
Air Force - 85
DLA - CC

Preparing activity:
DLA - CC

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