

INCH-POUND

MIL-DTL-39024B  
 3 February 2003  
 SUPERSEDING  
 MIL-C-39024A  
 25 October 1972

## DETAIL SPECIFICATION

### JACK, TIP (TEST POINT, PANEL OR PRINTED WIRING TYPE), 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 covers the general requirements for panel or printed wiring type test point connectors for use in electrical and electronic equipment (see 6.1). As used in this specification, the term "connectors" includes tip jacks.

1.2 Classification. Connectors covered by this specification are single-contact or multiple-contact connectors, as specified (see 3.1).

1.2.1 Part or Identifying Number (PIN). The military PIN consists of the letter "M" followed by the basic number of specification sheet, and an assigned dash number (see 3.1), as shown in the following:

	M39024/1-	01	G
Military designator and specification sheet number	_____	_____	_____
Dash number designation on specification sheet	_____	_____	_____
Plating signifier (gold)	_____	_____	_____

#### 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 documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center Columbus, Attn: VAI, 3900 East Broad Street, Columbus, Ohio, 43216-5000 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

## MIL-DTL-39024B

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 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

## DEPARTMENT OF DEFENSE

- MIL-DTL-16878 - Wire, Electrical, Insulated, General Specification for.
- MIL-DTL-55330 - Connectors, Electrical and Fiber Optic, Packaging of.

(See supplement 1 for associated specification sheets.)

## STANDARDS

## FEDERAL

- FED-STD-H28 - Screw-Thread Standards for Federal Services.
- FED-STD-595 - Colors used in Government Procurement.

## DEPARTMENT OF DEFENSE

- MIL-STD-202 - Electronic and Electrical Component Parts.
- MIL-STD-889 - Dissimilar Metals.
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.
- MIL-STD-1344 - Test Methods for Electrical Connectors.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available 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 documents, which are DoD adopted, are those listed in the issue DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

- ASTM B16/B16M - Rod, Brass, Free-cutting, Bar and Shapes for Use in Screw Machines.
- ASTM B139/B139M - Rod, Phosphor Bronze, Bar, and Shapes.
- ASTM B194 - Copper Beryllium Alloy Plate, Sheet, Strip and Rolled Bar.
- ASTM B196/B196M - Rod and Bar, Copper-Beryllium Alloy.
- ASTM B197/B197M - Wire, Alloy Copper-Beryllium.
- ASTM A342/A342M - Materials, Feebly Magnetic, Permeability Of.
- ASTM B488 - Electrodeposited Coatings of Gold for Engineering Uses.
- ASTM D635 - Plastics in a Horizontal Position, Rate of Burning and/or Extent and Time of Burning of.
- ASTM B740 - Copper-Nickel-Tin Spinodal Alloy Strip.
- ASTM A967 - Chemical Passivation Treatments for Stainless Steel Parts.
- ASTM D2863 - Plastics, Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of (Oxygen Index).
- ASTM D4894 - Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials.
- ASTM D5948 - Compounds, Molding, Thermosetting.

(Applications for copies should be addressed to the ASTM International, 100 Barr Drive, West Conshohocken, Pennsylvania, USA 19428-2959.)

## MIL-DTL-39024B

## INSTITUTE FOR INTERCONNECTING AND PACKAGING ELEC CIRCUITS (IPC)

IPC 2221	-	Printed Boards Design, Generic Standard for.
J-STD-004	-	Soldering Fluxes, Requirements for.
J-STD-005	-	Soldering Pastes, Requirements for.
J-STD-006	-	Electronic Grade Solder Alloys and Fluxed and Non-fluxed Solid Solders for Electronic Soldering, Applications Requirements for.

(Application for copies should be addressed to the Institute for Interconnecting and Packaging Elec Circuits, 2215 Sanders Road, Northbrook, IL 60062.)

## INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 10012-1	-	Equipment, Quality Assurance Requirements for Measuring – Part 1: Metrological Confirmation System for Measuring Equipment.
-------------	---	---

(Application for copies should be addressed to the American National Standards Institute, 25 West 43<sup>rd</sup> Street, New York, NY 10036.)

## NATIONAL CONFERENCE OF STANDARDS LABS (NCSL)

ANSI/NCSL Z540-1	-	Laboratories, Calibration, and Measuring and Test Equipment.
------------------	---	--

(Application for copies should be addressed to the National Conference of Standards Labs, 1800 30<sup>th</sup> Street, Suite 305B, Boulder, CO 80301.)

## AMERICAN SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS 2418	-	Copper Plating.
SAE AMS-P-81728	-	Plating, Tin-Lead (Electrodeposited).
SAE AMS QQ-P-35	-	Passivation Treatment for Corrosion-Resistant Steel.
SAE AMS-QQ-N-290	-	Nickel Plating (Electrodeposited).

(Application for copies should be addressed to the American Society Of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

HP-3	-	Electrical and Electronic PTFE (Polytetrafluoroethylene) Insulated High Temperature Hook-up Wire; Types ET (250 Volts), E (600 Volt), and EE (1000 Volts).
------	---	--

(Application for copies should be addressed to the National Electrical Manufacturers Association, 1300 North Seventeenth Street, Suite 1847, Rosslyn, VA 22209.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for associated detail specifications, specification sheets, or MS standards), 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 the specification sheet, the latter shall govern (see 6.2).

## MIL-DTL-39024B

3.2 Qualification. Connectors furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.4 and 6.3).

3.3 Materials. Materials shall be as specified herein; however, when a definite material is not specified, a material shall be used which will enable the connectors to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

### 3.3.1 Metals parts.

3.3.1 Nonmagnetic materials. All parts shall be made from materials which are classified as nonmagnetic.

3.3.1.2 Dissimilar metals. Where dissimilar materials are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided. Dissimilar metals shall be as defined in MIL-STD-889. Dissimilar metals such as brass, copper, or steel (except corrosion-resisting steel, passivated in accordance with SAE AMS QQ-P-35 or ASTM A967) shall not be used in intimate contact with aluminum or aluminum alloy.

3.3.1.3 Metals and finishes. All exposed metals parts, except electric contacts, terminals, and corrosion-resisting steel parts shall be nickel-plated in accordance with class 1, type 2, of SAE AMS-QQ-N-290. Steel parts shall be passivated in accordance with SAE AMS QQ-P-35 or ASTM A967.

3.3.1.4 Contacts. Contact springs and tabs shall be made of beryllium copper in accordance with ASTM B194, ASTM B196, or ASTM B197; or when specified (see 3.1) phosphor bronze in accordance with ASTM B139/B139M or copper nickel alloy C72900 in accordance with ASTM B740. The contact springs and tabs, and that portion of the body that provides a normal force to the test probe shall be gold plated in accordance with ASTM B488, type 3, code C, class 1.27, over an underplate either of copper, in accordance with SAE AMS-2418; 0.0002 inch minimum thickness, or nickel in accordance with class 2 of SAE AMS QQ-N-290, 0.00003 to 0.00015 inch thickness.

3.3.1.5 Terminals. Soldering terminals shall be made of a copper alloy material and shall be plated in one of the following manners:

- a. Gold plated in accordance with ASTM B488, type 3, code B or C, class 0.50 (0.00002 in) over a copper underplate in accordance with SAE AMS 2418, 0.0002 inch minimum.
- b. Gold plated in accordance with ASTM B488, type 3, code B or C, class 0.50 (0.00002 in) over a nickel underplate in accordance with SAE AMS QQ-N-290, class 2, 0.00003 to 0.00015 inch thickness.
- c. Tin lead plated in accordance with SAE AMS-P-81728, 50-70 percent tin 0.0001-inch thick minimum over nickel in accordance with SAE AMS QQ-N-290, class 2, 0.00003 to 0.00015 inch thick. For devices used in printed wiring applications.
- d. Tin lead plated in accordance with SAE AMS-P-81728, 50 to 95 percent tin 0.0001-inch thick minimum over nickel in accordance with SAE AMS QQ-N-290, class 2, 0.00003 to 0.00015 inch thick. For devices used in non-printed wiring applications.
- e. Solder coated in accordance with J-STD-004, J-STD-005, and J-STD-006, SN60, 0.0003 inch thick over copper accordance with SAE AMS 2418, 0.0002 inch minimum thickness.
- f. Solder coated in accordance with J-STD-004, J-STD-005, and J-STD-006, SN60, 0.0003 inch thick over nickel accordance with SAE AMS QQ-N-290, class 2, 0.00003 to 0.00015 inch thick.

NOTE: Those parts with gold plated solder terminals shall be identified by a suffix G on the PIN, for example, M39024/18-07G. For replacement purposes, the Government will stock and issue only those parts having gold plated solder terminals.

3.3.1.5.1 Delivery from stock. Qualified manufacturers and their selling agents or distributors may ship the stock connectors which were qualified to the preceding issue of MIL-C-39024 for a period of 1 year from the date of this specification change, unless otherwise specified (see 3.1).

## MIL-DTL-39024B

3.3.2 Plastic parts. Plastic parts shall be made of type GDI-30F or type SDG-F of ASTM D5948, or, when specified (see 3.1), polytetrafluoroethane of ASTM D4894. When applicable, insulation colors shall conform to FED-STD-595, as specified (see 3.1).

3.3.2.1 Flammability. Plastic materials shall be limited to those certified by their manufacturers as self-extinguishing in accordance with ASTM D635 and ASTM D2863.

3.3.3 Threaded parts. Screw threads for threaded parts shall conform to FED-STD-H28, and shall be as specified (see 3.1).

3.4 Design, construction, and physical dimensions. Connectors shall be of the design, construction, and physical dimensions specified (see 3.1). Unless otherwise specified (see 3.1), connectors shall have an operating temperature range of -65°C to +125°C.

3.4.1 Contacts. Contacts shall be closed-entry design. The closed-entry feature shall be an integral part of the socket contact. The socket contact shall provide the spring action for maintaining the contact pressure between the test probe and socket. Contacts shall accept test probes  $0.040 \pm 0.001$  or  $0.080 \pm 0.001$  inch in diameter, as specified (see 3.1).

3.4.1.1 Contact identification. Contact positions on multiple-contact connectors shall be permanently identified by legible letters or numerals, as specified (see 3.1), molded or stamped on the front and rear face of the connector body. Marking shall be arranged to avoid confusion between contacts.

3.4.1.2 Contact arrangement. The center-to-center distance between contacts shall be as specified (see 3.1).

3.4.1.3 Contact finish. Contact finish shall be smooth, free of shear lines, tear out or scratches, and shall show no signs of porosity or surface cracks.

3.4.1.4 Contact current rating. The current rating of contacts shall be as shown in table I, as specified (see 3.1).

TABLE I. Contact current rating.

Contact diameter (inches)	Maximum current rating (amperes)
0.040	3
0.080	5

3.4.2 Mounting hardware. Screws, clamps, brackets, or similar means for mounting the connectors shall be furnished, when specified (see 3.1).

### 3.5 Performance.

3.5.1 Permeability. When connectors are tested as specified in 4.6.3, the permeability shall be less than 2.0 Mu.

3.5.2 Contact resistance. When connectors are tested as specified in 4.6.4, the voltage drop shall be not greater than 20 millivolts, unless otherwise specified (see 3.1).

3.5.3 Insulation resistance. When measured as specified in 4.6.5, the insulation resistance shall be 5,000 megohms or greater.

3.5.4 Dielectric withstanding voltage. When tested as specified in 4.6.6, connectors shall withstand the test voltage specified (see 3.1) with no evidence of flashover.

3.5.5 Insertion and withdrawal forces. When connectors are tested as specified in 4.6.7, the forces required to insert and withdraw the test probes (see 4.6.1.1) shall be as specified (see 3.1).

3.5.6 Resistance to test-probe damage. When tested as specified in 4.6.8, socket contacts and connectors shall be capable of withstanding the bending moment and depth of test probe insertion with no visual evidence of physical damage.

## MIL-DTL-39024B

3.5.7 Thermal shock. When tested as specified in 4.6.9, connectors shall show no visual evidence of physical damage.

3.5.8 Shock (specified pulse). When tested as specified in 4.6.10, connectors shall show no visual evidence of mechanical damage, loosening of parts, rupturing of dielectric materials, or loss of electrical continuity in excess of 10 microseconds.

3.5.9 Vibration. When connectors are tested as specified in 4.6.11, there shall be no loss of electrical continuity in excess of 10 microseconds during the test. After the test, connectors shall meet the following requirements:

Visual examination:	There shall be no cracking, breaking, or loosening of parts or other evidence of physical damage.
Insertion and withdrawal forces:	Shall be as specified in 3.5.5.
Contact resistance:	Shall be as specified in 3.5.2, unless otherwise specified (see 3.1).

3.5.10 Humidity (steady state). When tested as specified in 4.6.12, connectors shall show no visual evidence of physical damage and the insulation resistance shall exceed 100 megohms after the test and shall exceed 1,000 megohms after a 24-hour drying period.

3.5.11 Salt spray (corrosion). When connectors are tested specified in 4.6.13, there shall be no exposure of the basis metal. After the test, the contact resistance shall be as specified in 3.5.2, unless otherwise specified (see 3.1).

3.5.12 Durability. When tested as specified in 4.6.14, connectors shall show no visual evidence of electrical or mechanical damage and shall meet the following requirements:

Insertion and withdrawal forces:	Shall be as specified in 3.5.5.
Contact resistance:	Shall be as specified in 3.5.2, unless otherwise specified (see 3.1).

3.5.13 Solderability. Solderable surfaces shall meet the requirements of MIL-STD-202, methods 208 for solderability after 8 hours steam aging.

3.6 Identification marking. Connectors shall be marked in accordance with method I of MIL-STD-1285, with the complete PIN, manufacturer's name or trademark, and when specified (see 3.1), the date and source code. Marking shall be located on the connector so that it will be visible after installation, unless this is impossible because of space limitations. In such cases, required marking shall be applied to an envelope, bag, box or other intermediate container suitable for shelf storage.

3.7 Workmanship. Connectors shall be processed in such a manner as to be uniform in quality and shall be free from pits, cracks, rough edges, and other defects that will affect life, serviceability, or appearance.

#### 4. VERIFICATION

4.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ISO 10012-1, ANSI/NCSL Z540.1, or comparable standards.

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

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

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-1344.

## MIL-DTL-39024B

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the qualifying activity (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.4.1 Sample size. Twenty-four connectors of each type, size, and terminal style (if applicable) shall be subjected to qualification inspection.

4.4.2 Inspection routine. The sample shall be subjected to the inspections specified in table II, in the order shown. All sample units shall be subjected to the inspection of group I. The sample shall then be divided equally into four groups of six units each, and subjected to the inspections for their particular group.

4.4.3 Failures. One or more failures shall be cause for refusal to grant qualification approval.

4.4.4 Retention of qualification. The supplier shall forward reports to the qualifying activity as indicated below. The qualifying activity shall establish the initial reporting date. Reports shall be as follows:

- a. A 'summary report' of the results of the tests performed for inspection of product for delivery (groups A and B), indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and accounted for. The summary report shall be submitted at 12-month intervals.
- b. A 'test data report' of the results of tests performed for periodic check tests (group C), including the number and mode of failures. The summary shall include results of all periodic check tests performed and completed during the first 24-month period with subsequent reporting periods of 36 months. If the summary of the test results indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the Qualified Products List (QPL).

Failure to submit the report within 30 days after the end of each 24-or 36-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the supplier shall immediately notify the qualifying activity at any time during the 24-or 36-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during two consecutive periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit the product to testing in accordance with the qualification inspection requirements.

4.4.5 Extension of qualification. Test point connectors of the same type, size, and terminal style (if applicable) shall be qualified for any permissible color other than that tested during qualification inspection, provided that the material, design, construction, and physical dimensions used are identical.

#### 4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspections.

4.5.2 Inspection lot. An inspection lot, as far as practicable, shall consist of all connectors of the same basic type, size, and terminal style (if applicable), produced under essentially the same conditions, and offered for inspection at one time. When a connector has different colors of insulation, an inspection lot may include any quantity and variety of colors provided that the units are otherwise mechanically and dimensionally identical.

4.5.2.1 Group A inspection. Group A inspection shall consist of the examination and test specified in table III, and shall be made on the same set of sample units, in the order shown.

4.5.2.1.1 Sampling plan (group A). Table III tests shall be performed on a production lot basis. Samples shall be selected in accordance with table IV. If one or more defects are found, the lot shall be screened for those particular defects and the defects shall be removed. A new sample of parts shall be selected in accordance with table IV and all group A tests again performed. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification.

## MIL-DTL-39024B

TABLE II. Qualification inspection.

Inspection	Requirement paragraph	Test paragraph
<u>Group I (all specimens)</u> <u>1/</u>		
Visual and mechanical examination	3.1, 3.3, 3.4, 3.6 and 3.7	4.6.2
Permeability	3.5.1	4.6.3
<u>Group II (6 specimens)</u>		
Contact resistance	3.5.2	4.6.4
Insulation resistance	3.5.3	4.6.5
Dielectric withstanding voltage	3.5.4	4.6.6
Insertion and withdrawal forces	3.5.5	4.6.7
Resistance to test-probe damage	3.5.6	4.6.8
<u>Group III (6 specimens)</u>		
Thermal shock	3.5.7	4.6.9
Shock (specified pulse)	3.5.8	4.6.10
Vibration	3.5.9	4.6.11
Humidity (steady state)	3.5.10	4.6.12
<u>Group IV (6 specimens)</u>		
Salt spray (corrosion)	3.5.11	4.6.13
Durability	3.5.12	4.6.14
<u>Group V (6 specimens)</u>		
Solderability	3.5.13	- - -

1/ Only 2 samples each for physical dimensions.

TABLE III. Group A inspection.

Examination or test	Requirement paragraph	Test paragraph	Sampling procedure
Visual and mechanical examination <u>1/</u>	3.1, 3.3, 3.4, 3.6, and 3.7	4.6.2	See table IV
Permeability	3.5.1	4.6.3	

1/ Only 2 samples each for physical dimensions.



## MIL-DTL-39024B

TABLE IV. Inspection level.

Lot size			Visual and mechanical inspection	
			Major <u>1/</u>	Minor <u>2/ 3/</u>
1	to	3	all	all
4	to	13	all	3
14	to	25	13	3
26	to	50	13	5
51	to	90	13	6
91	to	150	13	7
151	to	280	20	10
281	to	500	29	11
501	to	1,200	34	15
1,201	to	3,200	42	18
3,201	to	10,000	50	22
10,001	to	35,000	60	29
35,001	to	150,000	74	29
150,001	to	500,000	90	29
500,001	and	over	102	29

- 1/ Major defect: A major defect is a defect, other than critical, that is likely to results in failure, or to reduce materially the usability of the unit of product for its intended purpose.
- 2/ Minor defect: A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.
- 3/ Samples inspected for minor defects may be taken from the same samples inspected for major defects, or may be other samples from the same production lot.

4.5.2.2 Group B inspection. Group B inspection shall consist of the inspections specified in table V in the order shown and shall be made on sample units which have been subjected to and passed the group A inspection.

4.5.2.2.1 Group B sampling plan. A sample of parts shall be randomly selected in accordance with table VI. If one or more defects are found, the lot shall be screened for that particular defect and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected and subjected to all tests in accordance with table V. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification.

TABLE V. Group B inspection.

Test	Requirement paragraph	Test paragraph
Contact resistance	3.5.2	4.6.4
Insulation resistance	3.5.3	4.6.5
Dielectric withstanding voltage <u>1/</u>	3.5.4	4.6.6
Insertion and withdrawal forces	3.5.5	4.6.7
Resistance to test-probe damage	3.5.6	4.6.8

- 1/ Test at altitude is not required.

## MIL-DTL-39024B

TABLE VI. Inspection level.

Lot size			Sample size
1	to	4	all
5	to	50	5
51	to	90	7
91	to	150	11
151	to	280	13
281	to	500	16
501	to	1,200	19
1,201	to	3,200	23
3,201	to	10,000	29
10,001	to	35,000	35
35,001	and	over	40

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

4.5.3 Periodic check test. Periodic check tests shall consist of group C. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.5.3.1.3), delivery of products which have passed groups A and B inspections shall not be delayed pending the results of these periodic check tests.

4.5.3.1 Group C inspection. Group C inspection shall consist of the tests specified in table VII in the order shown. Group C inspection shall be made on sample units selected from inspection lots which have passed groups A and B inspections.

4.5.3.1.1 Sampling plan. Ten sample units of the same basic type shall be selected after 18 months (first period); after 2 years (second period); and after 3 years (third period). No failures will be permitted.

TABLE VII. Group C inspection.

Test	Requirement paragraph	Test paragraph	Number of sample units to be inspected
<u>Subgroup 1</u>			
Dielectric withstanding voltage	3.5.4	4.6.6	6
Thermal shock	3.5.7	4.6.9	
Shock (specified pulse)	3.5.8	4.6.10	
Vibration	3.5.9	4.6.11	
Humidity (steady state)	3.5.10	4.6.12	
<u>Subgroup 2</u>			
Salt spray (corrosion)	3.5.11	4.6.13	2
Durability	3.5.12	4.6.14	
<u>Subgroup 3</u>			
Solderability	3.5.13	-----	2

## MIL-DTL-39024B

4.5.3.1.2 Disposition of sample units. Sample units which have been subjected to group C inspection, shall not be delivered on the contract.

4.5.3.1.3 Noncompliance. If a sample fails to pass group C inspection, the supplier shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials and processes, and so forth, and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed, at the option of the qualifying activity). Groups A and B inspections may be reinstituted; however, final acceptance shall be withheld until the group C reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and the corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.4. Inspection of packaging. The sampling and inspection of the preservation, packing, and container marking shall be in accordance with the requirements of MIL-DTL-55330.

#### 4.6 Methods of examination and test.

4.6.1 Preparation for testing. Connectors shall be mounted to appropriate metal panels or printed wiring boards utilizing specified mounting hardware. For electrical tests, terminals shall be wired or soldered with type E wire of NEMA HP-3 (size as specified, see 3.1) to the appropriate panel or to the printed wiring boards conforming to IPC 2221, as appropriate.

4.6.1.1 Electrical test probes. Probes used for test purposes shall be  $0.080 \pm 0.001$  or  $0.040 \pm 0.001$  inch in diameter after plating, as appropriate, and  $\frac{1}{2}$  -inch minimum length, or as specified (see 3.1). Probes shall be brass rod,  $\frac{1}{2}$  hard (HO2), Copper alloy UNS No. C36000, in accordance with ASTM B16/B16M, and nickel-plated in accordance with type V (FC), class 2, of SAE AMS-QQ-N-290.

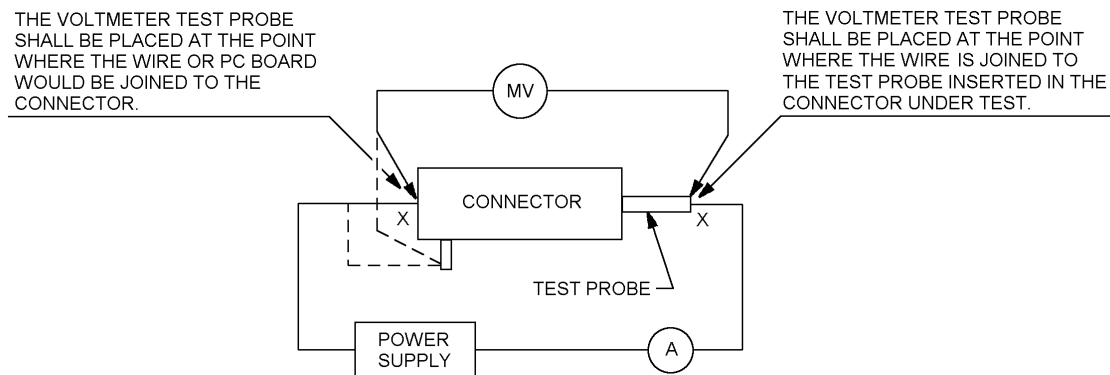
4.6.2 Visual and mechanical examination. Connectors shall be examined to verify that the design, construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements (see 3.1, 3.3, 3.4, 3.6, and 3.7).

4.6.3 Permeability (see 3.5.1). The permeability of all metal parts shall be measured with an indicator conforming to ASTM A342/A342M.

4.6.4 Contact resistance (see 3.5.2). Connectors shall be tested in accordance with method 3004 of MIL-STD-1344. The following details and exception shall apply.

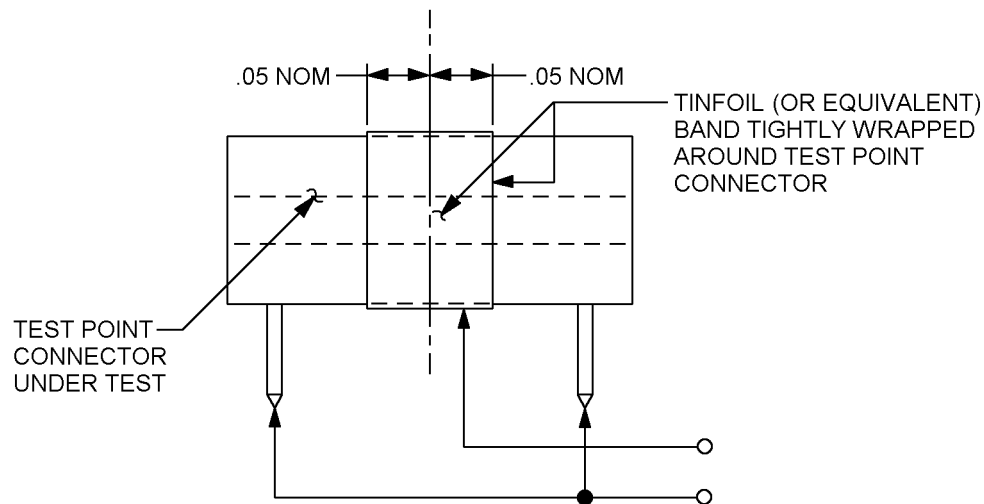
- a. Method of connection - In accordance with figure 1. Measurements shall be made after the temperature of the wire has stabilized.
- b. Test current - As specified in table I.
- c. Points of measurement - Across each mated test probe and connector between the two points indicated "X"—"X" on figure 1.
- d. Number of activations prior to measurement - Not applicable.
- e. Number of test activations - Not applicable.
- f. Number of measurements per activation - Not applicable.

## MIL-DTL-39024B

FIGURE 1. Resistance of contacts (potential drop).

4.6.5 Insulation resistance (see 3.5.3). Connectors shall be tested in accordance with method 3003 of MIL-STD-1344 (any number of contacts may be tested simultaneously). The following details and exceptions shall apply:

- a. Magnitude of test voltage - 100 volts  $\pm$  10 percent. On multiple-contact connectors, the voltage shall be applied between all contacts alternately connected.
- b. Special conditions - In accordance with figure 2, when specified (see 3.1).
- c. Points of measurement - Between all contacts and the panel or test mount, and between all adjacent contacts.
- d. Electrification time - Not to exceed 1 minute.
- e. Test condition letter - A of method 302, MIL-STD-202.



## NOTES:

1. Meters, bridges or other apparatus, when required, shall be incorporated in the circuit.
2. Thickness of the conductive band (e.g., tinfoil) shall be such that it can withstand the applied voltage.

FIGURE 2. Test circuit for dielectric withstanding voltage and insulation resistance tests.

## MIL-DTL-39024B

4.6.6 Dielectric withstanding voltage (see 3.5.4). Connectors shall be tested in accordance with method 3001 of MIL-STD-1344. The following details shall apply:

- a. Special conditions - In accordance with figure 2, when specified (see 3.1).
- b. Magnitude of test voltage - As specified (see 3.1).
- c. Duration of application of test voltage - For a period of 1 minute, unless otherwise specified (see 3.1).
- d. Points of application of test voltage - Between current-carrying parts and ground, unless otherwise specified (see 3.1). On multiple-contact connectors, the voltage shall be supplied between all contacts alternately connected.

4.6.7 Insertion and withdrawal forces (see 3.5.5). A test probe conforming to 4.6.1.1 shall be fully inserted three times into the connector socket contact and withdrawn. The test probe shall again be inserted and insertion and withdrawal forces shall be measured.

4.6.8 Resistance to test-probe damage (see 3.5.6). A mechanical test probe of hardened steel having a diameter equal to nominal diameter ( $0.040 \pm .001$  inch or  $0.080 \pm .001$  inch) mating probe shall be inserted into each socket to 1/8-inch, 3/16-inch, and 1/4-inch depths. At each of these depths, measured from the face of the insulator or connector body, a bending moment of 2 inch-pounds  $\pm 10$  percent (0.080 test probe) or 1/2 inch-pound  $\pm 10$  percent (0.040 test probe) shall be applied to the probe about the inserted end of the probe and the connector shall be rotated in one direction through 360 degrees, in order that a uniform force is applied to the inside surface of the socket. This test shall be performed with the socket contacts in the insulator or connector body, mounted on a printed wiring board or by panel, as applicable, by the normal means, and the sockets locked and soldered to prevent rotation during the test.

In order to insure uniform test results, the test fixture shown on figure 3 shall be used. Procedures shall be as follows:

- a. With the weight in position for the 2 inch-pound or 1/2 inch-pound moment and size 1 spacer on the pin, insert the pin in a socket while the axis of the socket is in a horizontal position. With the fixture free and unsupported, rotate the socket 360 degrees about a horizontal axis, maintaining the socket in a horizontal position.
- b. Repeat with size 2 spacer.
- c. Repeat with size 3 spacer.
- d. For connectors having a maximum insertion depth of 1/8 inch, only the test using the size 1 spacer (see 4.6.8(a)) is applicable. For connectors having a maximum insertion depth of 3/16 inch, only the tests using sizes 1 and 2 spacers (see 4.6.8 (a) and (b)) are applicable. For connectors having a maximum insertion depth of 1/4 inch, tests using all three spacers are required.

After withdrawal of the fixture, the socket shall be visually examined for evidence of physical damage.

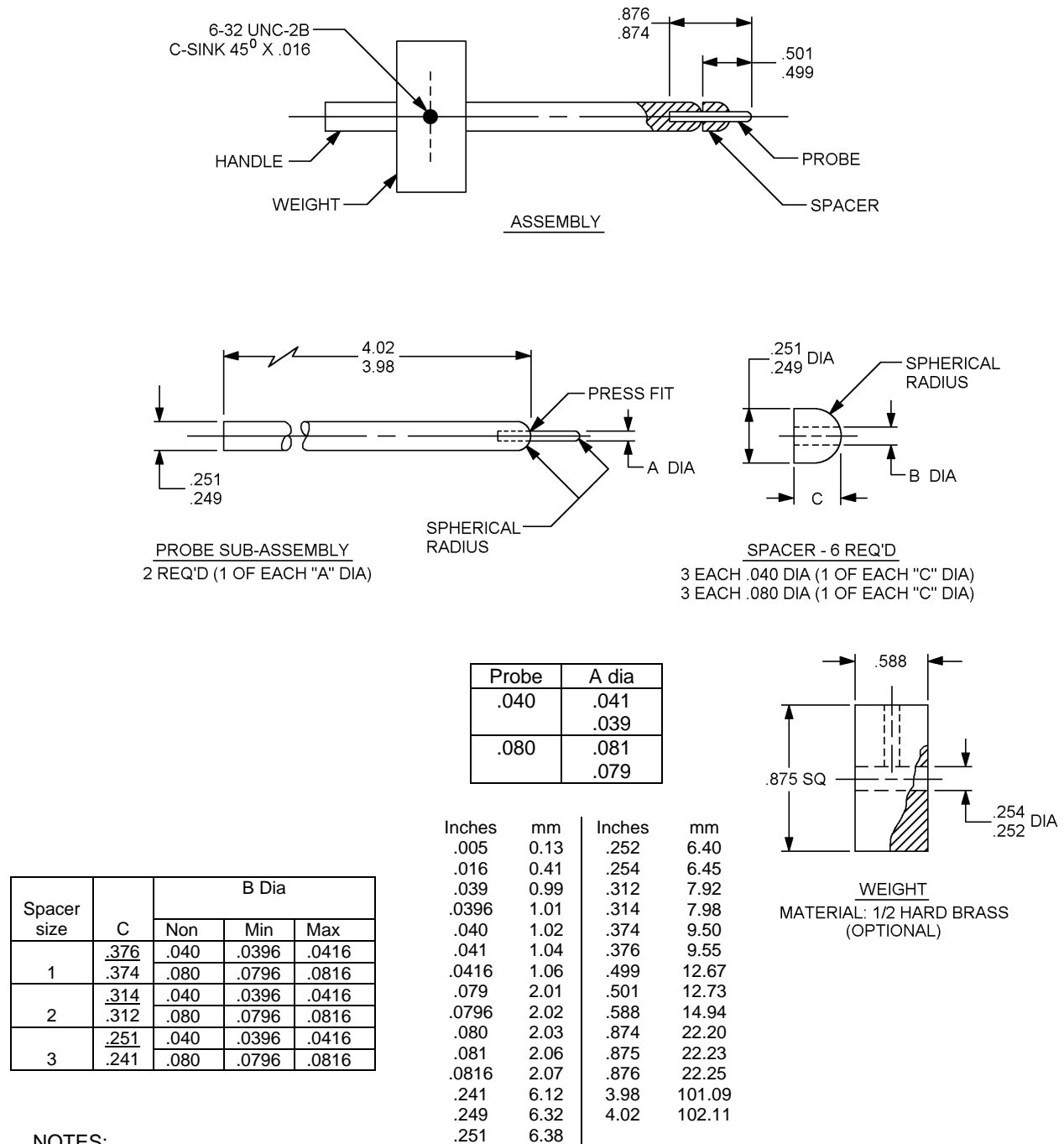
4.6.9 Thermal shock (see 3.5.7). Connectors with unwired test probes inserted into contact sockets shall be tested in accordance with method 1003 of MIL-STD-1344. The following details shall apply:

- a. Test condition letter – B of method 107, MIL-STD-202 (or C, when specified (see 3.1)).
- b. Examination after test – Connectors shall be visually examined for evidence of physical damage.

4.6.10 Shock (specified pulse) (see 3.5.8). Connectors, properly mated, shall be tested in accordance with method 2004 of MIL-STD-1344. The following details and exception shall apply:

- a. Mounting methods - By normal mounting means (see 4.6.1).
- b. Test condition letter: - G.
- c. Measurements during shock test - Connectors shall be monitored for electrical continuity both during and after the test. Loss of continuity for a period of longer than 10 microseconds constitutes a failure. All wiring shall be in accordance with 4.6.1.
- d. When specified (see 3.1), mating probe to be held in position with a retaining nut.

## MIL-DTL-39024B



## NOTES:

1. Dimensions are in inches.
2. Metric equivalents to the nearest .01 mm are given for general information only, and are based on 1 inch = 25.4 mm.
3. Unless otherwise specified, tolerance is .XXX ± .005.
4. Break all sharp edges.

FIGURE 3. Test fixture for resistance to test probe damage.

## MIL-DTL-39024B

4.6.11 Vibration (see 3.5.9). Connectors shall be tested in accordance with method 2005 of MIL-STD-1344. The following details shall apply:

- a. Test condition number - III.
- b. Measurement during test - Connectors shall be monitored for electrical continuity during the test. Equipment shall be sufficiently sensitive to detect any interruption with a duration of 10 microseconds.
- c. Tests after vibration - Insertion and withdrawal and contact resistance shall be measured as specified in 4.6.7 and 4.6.4 respectively.

4.6.12 Humidity (steady state) (see 3.5.10). Connectors shall be tested in accordance with method 1002 of MIL-STD-1344. The following details shall apply:

- a. Test-condition letter - B.
- b. Final measurements - Insulation resistance shall be measured as specified in 4.6.5.

4.6.13 Salt spray (corrosion) (see 3.5.11). Connectors shall be tested in accordance with method 1001 of MIL-STD-1344. The following details shall apply:

- a. Test condition letter - B.
- b. Measurements after exposure - Immediately after exposure, connectors shall be washed with tap water and allowed to dry for 6 hours maximum in a circulating air oven at a temperature of  $38^{\circ}\text{C} \pm 3^{\circ}\text{C}$ . After drying, contact resistance shall be measured as specified in 4.6.4.

4.6.14 Durability (see 3.5.12). A test probe conforming to 4.6.1.1, shall be fully inserted into the connector socket contacts and withdrawn for a total of 500 insertion-withdrawal cycles, except as specified (see 3.1), at a rate not to exceed 100 cycles per hour. After the test, insertion and withdrawal and contact resistance shall be measured as specified in 4.6.7 and 4.6.4 respectively.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. 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. The test point connectors covered by this specification are primarily for use in airborne, ground support, and shipboard electrical and electronic equipment.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).
- c. Packaging requirements (see 5.1).
- d. Title, number and date of the applicable specification sheet.
- e. The complete PIN of the part ordered.

## MIL-DTL-39024B

- f. Refer to the contract or purchase order for guidance on the disposition of rejected components.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the applicable QPL-39024 whether or not such products have actually been so listed by that date. The attention of the contractors is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Columbus (DSCC-VQ), P.O. Box 3990, Columbus, Ohio 43216-5000.

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained from Standardization Document Order Desk at the address shown in 2.2.1.

6.4 Group C inspection. Approval to ship may be withheld, at the discretion of the Government, pending the decision from the contracting officer on the adequacy of corrective action (see 4.5.3.1.3).

6.5 Hazardous materials. Nickel has been identified by the Environmental Protection Agency (EPA) as a hazardous material only recommended for use when other materials cannot meet performance requirements.

6.6 Subject term (key word) listing.

Closed-entry  
Connector  
Copper-beryllium  
Multiple-contact  
Single-Contact

6.7 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.

## CONCLUDING MATERIAL

## Custodians:

Army - CR  
Navy - EC  
Air Force - 11  
DLA - CC

Preparing activity:  
DLA - CC

(Project 5935-4240-000)

## Review activities:

Army - AR, CR4, MI  
Navy - AS, MC, OS  
Air Force - 19



## 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, and send to preparing activity.
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.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER  
MIL-DTL-39024B

2. DOCUMENT DATE  
(YYYYMMDD)  
2000MMDD

## 3. DOCUMENT TITLE

Jack, Tip (Test Point, Panel or Printed Wiring Type), General Specification For

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

## 5. REASON FOR RECOMMENDATION

## 6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include zip code)

d. TELEPHONE (Include Area Code)  
(1) Commercial  
(2) DSN  
(if applicable)

7. DATE SUBMITTED  
(YYYYMMDD)

## 8. PREPARING ACTIVITY

a. NAME

Defense Logistics Agency  
Defense Supply Center, Columbus

b. TELEPHONE (Include Area Code)

(1) Commercial 614-692-0538  
(2) DSN 850-0538

c. ADDRESS (Include Zip Code)

DSCC-VAI  
P.O. Box 3990  
Columbus, Ohio 43216-5000

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS,  
CONTACT:

Defense Standardization Program Office (DLSC-  
LM)

8725 John J. Kingman Road, Suite 2533  
Fort Belvoir, Virginia 22060-6621

Telephone (703) 767-6888 DSN 427-6888