

INCH-POUND

MIL-DTL-28754E
3 May 2016
SUPERSEDING
MIL-C-28754D
21 APRIL 1989

DETAIL SPECIFICATION
CONNECTORS, ELECTRICAL, MODULAR,
AND COMPONENT PARTS
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 backplane connectors, module connectors, cable connectors, and their component parts.

1.2 Classification.

1.2.1 Types. Connectors and assemblies covered by this specification are of the following types:

Type III – Aluminum base plate assembly with contact and bushing set.

Type IV – Module blade connector assembly on 100 mil grid.

Type V – Cable connector assembly on 100 mil grid, with a dielectric block containing crimp or solder blade contacts.

1.2.2 Component parts. In addition, this specification covers component parts utilized in type III through type V assemblies, or in related applications.

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.

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 (see 6.2).

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, ATTN: VAI, P.O. Box 3990, Columbus, OH 43218-3990 or email: RectangularConnector@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.dla.mil>.



MIL-DTL-28754E

FEDERAL SPECIFICATIONS

L-P-410 - Plastic, Polyamide (Nylon), Rigid, Rods, Tubes, Flats, Molded and Cast Parts

FEDERAL STANDARDS

FED-STD-H28 - Screw-Thread Standards for Federal Services

COMMERCIAL ITEM DESCRIPTIONS

A-A-56032 - Ink, Marking, Epoxy Base

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5541 - Chemical Conversion Coatings on Aluminum and Aluminum Alloys.
MIL-A-8625 - Anodic Coatings, for Aluminum and Aluminum Alloys.
MIL-DTL-14072 - Finishes For Ground Electronic Equipment.
MIL-DTL-45204 - Gold Plating, Electrodeposited.
MIL-DTL-55330 - Connectors, Electrical and Fiber Optic, Packaging of.

(See supplement 1 for list of associated specification sheets.)

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-202-105 - Test Methods Standard Method 105, Barometric Pressure (Reduced)
MIL-STD-202-208 - Test Methods Standard Method 208, Solderability
MIL-STD-202-211 - Test Methods Standard Method 211, Terminal Strength
MIL-STD-889 - Dissimilar Metals.
MIL-STD-1130 - Connections, Electrical, Solderless Wrapped.
MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at <http://quicksearch.dla.mil>)

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 are those cited in the solicitation or contract (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ASME Y 14.5 - Dimensioning and Tolerancing
ASME B 46.1 - Surface Texture (Surface Roughness, Waviness and Lay).

(Copies of these documents are available on-line at <http://www.ansi.org>.)

ASTM INTERNATIONAL

ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A582/A582M - Standard Specification for Free Machining Bars

MIL-DTL-28754E

- ASTM A827/A827M - Standard Specification Plates, Carbon Steel, for Forging and Similar Applications
- ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet , Stripe, Plate, and Flat Bar
- ASTM A693 - Standard Specification for Precipitation-Hardening Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
- ASTM B16/B16M - Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines
- ASTM B36/B36M - Standard Specification for Brass Plate, Sheet, Stripe, and Rolled Bar
- ASTM B121/B121M - Standard Specification for Leaded Brass Plate, Sheet, Stripe, and Rolled Bar
- ASTM B122/B122M - Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar.
- ASTM B124/B124M - Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shaped
- ASTM B139/B139M - Standard Specification for Phosphor Bronze Rod, Bar, and Shapes
- ASTM B140/B140M - Standard Specification for Copper-Zinc-Lead (Red Brass or Hardware Bronze) Rod, Bars and Shapes
- ASTM B194 - Standard Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar
- ASTM B196/B196M - Standard Specification for Copper-Beryllium Alloy and Rod and Bar
- ASTM B197/B197M - Standard Specification for Alloy Copper-Beryllium Wire
- ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod and Wire
- ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
- ASTM B308/B308M - Aluminum-Alloy 6061-T6 Standard Structural Shapes
- ASTM B928/B928M - Standard Specification for High Magnesium Aluminum-Alloy Sheet and Plate for Marine Service and Similar Environments
- ASTM D635 - Standard Test Method for Rate of Burning and/ or Extent and Time of Burning of Plastics in a Horizontal Position
- ASTM D1867 - Standards Specification for Copper-Clad Thermosetting Laminates for Printed Wiring
- ASTM D4066 - Standard Specification for Nylon Injection and Extrusion Materials (PA)
- ASTM D5948 - Standard Specification for Molding Compounds, Thermosetting

(Copies of these documents are available online at <http://www.astm.org>)

ELECTRONIC COMPONENTS INDUSTRIES ASSOCIATION (ECIA)

- EIA-364 - Electrical Connector/Socket Test Procedures Including Environmental Classifications
- EIA-364-06 - Contact Resistance Test Procedure for Electrical Connectors
- EIA-364-08 - Crimp Tensile Strength Test Procedure for Electrical Connectors
- EIA-364-09 - Connectors and Contacts, Electrical, Durability Test Procedure for
- EIA-364-11 - Resistance to Solvents, Test Procedures for Electrical Connectors
- EIA-364-20 - Connectors, Sockets and Coaxial Contacts, Electrical, Withstanding Voltage Test Procedure for

MIL-DTL-28754E

- EIA/ECA-364-21 - Insulation Resistance Test Procedure for Electrical Connectors, Sockets, and Coaxial Contacts
- EIA-364-23 - Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets
- EIA/ECA-364-26 - Salt Spray Test Procedure for Electrical Connectors, Contacts and Sockets
- EIA-364-27 - Connectors, Electrical, Mechanical Shock (Specified Pulse) Test Procedure for
- EIA-364-28 - Connectors and Sockets, Electrical, Vibration Test Procedure for
- EIA/ECA-364-29 - Contact Retention Test Procedure for Electrical Connectors
- EIA-364-31 - Connectors and Sockets, Electrical, Humidity Test Procedure for
- EIA-364-32 - Connectors and Sockets, Electrical, Thermal Shock (Temperature Cycling) Test Procedure for
- EIA-364-37 - Contact Engagement and Separation Force Test Procedure for Electrical Connectors

(Copies of these documents are available online at <http://www.ecianow.org>)

NCSL INTERNATIONAL

NCSL Z540.3 - Calibration of Measuring and Test Equipment, Requirements for

(Copies of these documents are available online at <http://www.ncsli.org>)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC.

- SAE AMS-QQ-A-200/8 - Aluminum Alloy 6061 Bar, Rod, Shapes, Tube and Wire, Extruded A96061
- SAE AMS-QQ-A-225/6 - Aluminum Alloy, 2024, Bar, Rod, and Wire, Rolled, Drawn, or Cold Finished – UNS A92024.
- SAE AMS-QQ-A-225/9 - Aluminum Alloy 7075, Bar, Rod, Wire, and Special Shapes, Rolled, Drawn or Cold Finished (Stabilized Type) – UNS A97075
- SAE AMS-QQ-A-250/8 - Aluminum Alloy, 5052, Plate and Sheet (Stabilized Type) – UNS A95052
- SAE AMS-QQ-N-290 - Nickel Plating (Electrodeposited)
- SAE AMS-QQ-A-591 - Aluminum Alloy Die casting (Stabilized Type)
- SAE AMS-QQ-S-763 - Steel Bars, Wire, Shapes, and Forgings, Corrosion Resisting.
- SAE AMS2700 - Passivation of Corrosion Resistant Steels
- SAE AMS4025 - Aluminum Alloy, Sheet and Plate 1.0Mg – 0.60Si – 0.28Cu – 0.20Cr (6061;- T4 Sheet, -T451 Plate) Solution Heat Treated and Naturally Aged – UNS A96061
- SAE AMS4026 - Aluminum Alloy, Sheet and Plate 1.0Mg – 0.60Si – 0.28Cu – 0.20Cr (6061-O) Anealed - UNS A96061
- SAE AMS4027 - Aluminum Alloy, Sheet and Plate 1.0Mg – 0.60Si – 0.28Cu – 0.20Cr (6061;- T6 Sheet, -T651 Plate) Solution and Precipitation Heat Treated – UNS A96061
- SAE AMS4115 - Aluminum Alloy, Rolled or Cold-Finished, Bars, Rods, Wire, and Flash Welded Rings Annealed 1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-0) - UNS A96061
- SAE AMS4116 - Aluminum Alloy, Bars, Rods, and Wire 1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T4) Cold Finished, Solution Heat Treated and Naturally Aged - UNS A96061

MIL-DTL-28754E

SAE AMS4117	- Aluminum Alloy, Rolled or Cold Finished Bars, Rods, and Wire and Flash Welded Rings 1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061; -T6, -T651) Solution and Precipitation Heat Treated - UNS A96061
SAE AMS4128	- Aluminum Alloy Bars, Rolled or Cold Finished 1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T451) Solution Heat Treated and Stress Relieved by Stretching - UNS A96061
SAE AS81044	- Wire, Electrical, Crosslinked, Polyalkene, Crosslinked, Alkane-Imide Polymer, or Polyarylene Insulated, Copper or Copper Alloy
SAE EIA-557	- Statistical Process Control Systems
SAE AMS-STD-595	- Colors Used in Government Procurement

(Copies of these documents are available online at <http://standards.sae.org>)

2.3 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 sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern (see 6.2).

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

3.2.1 Statistical process control (SPC). The contractor shall implement and use SPC techniques in the manufacturing process for parts covered by this specification. The SPC program shall be developed and maintained in accordance with SAE EIA-557. Where SPC cannot be utilized because of non-continuous production requirements, a lot sampling plan for inspection in accordance with group A lot (see 4.5.1) and sample size with $c = 0$ can be utilized. The SPC and $c = 0$ programs shall be documented and maintained as part of the overall reliability assurance program as specified in SAE EIA-557. Evidence of such compliance shall be verified by the qualifying activity of this specification as a prerequisite for first article inspection.

3.3 Material. The material for each part shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the connectors and accessories to meet the performance requirements. Acceptance or approval of any constituent material shall not be construed as a guarantee of the acceptance of the finished product.

3.3.1 Interface materials, platings, and process.

3.3.1.1 Metal parts. All metal parts (other than current carrying parts) exposed to environmental conditions shall be of a corrosion-resistant material or shall be plated or chemically coated to resist corrosion during service life.

3.3.1.2 Dissimilar metals. Where dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided. Dissimilar metals shall be defined in

MIL-DTL-28754E

MIL-STD-889. Dissimilar metals such as brass, copper, or steel (except corrosion-resisting steel, passivated in accordance with 3.3.1.3) shall not be used in intimate contact with aluminum or aluminum alloys. However, spraying, coating, or plating of dissimilar base metals to provide similar abutting surfaces is permitted. See 6.6 for selection of compatible couples.

3.3.1.3 Corrosion resisting steel. Where applicable, corrosion resisting steel shall be 300 series, low magnetic permeability in accordance with ASTM A582/A582M, ASTM A827/A827M, SAE AMS-QQ-S-763, or ASTM A240/A240M, ASTM A666 and ASTM A693, (see 3.1) and passivated in accordance with SAE AMS2700 or to finish E300 as specified in MIL-DTL-14072.

3.3.1.4 Recycled, recovered, or environmentally preferable, or biobased materials. Recycled, recovered, or environmentally preferable, or biobased 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.

3.3.2 Base plate. When applicable the metal base plate for type III connectors shall be aluminum-alloy-sheet material in accordance with SAE AMS-QQ-A-250/8, SAE AMS4025, SAE AMS4026, SAE AMS4027, or for non-aerospace ASTM B209 (see 3.1 and 3.4).

3.3.2.1 Base plate finish. The aluminum base plate shall be anodized in accordance with MIL-A-8625, or chemically treated in accordance with MIL-DTL-5541.

3.3.3 Insulation (dielectric).

3.3.3.1 Insulator bushings (used on type III). The insulator bushings for type III connectors shall be polyamide (nylon) in accordance with L-P-410 or PA111 of ASTM D4066. The material shall be self-extinguishing in accordance with ASTM D635.

3.3.3.2 Connector bodies (used on types IV and V). Connectors shall be glass-fiber-filled phthalate in accordance with type SDG-F or type GDI-30F of ASTM D5948 (see 3.1). The color shall be green or black.

3.3.4 Contacts.

3.3.4.1 Contact design and construction. Contacts shall be of the design, construction and physical dimensions specified (see 3.1).

3.3.4.2 Contact materials. Type III female contacts shall be made from (d). Male blade type III contacts shall be made from (a), (b), or (c). Wrappost grounding contact for type III connectors shall be made from (e). All other contacts (types IV and V) shall be one of the following materials (see 3.1):

- (a) Phosphor bronze alloy as specified in ASTM B139/B139M, composition A, half hard.
- (b) Cadmium copper alloy, CABRA (Copper and Brass Association), No 162, in accordance with the following requirements:
 - (1) 99.1 percent copper and 0.9 percent cadmium.
 - (2) Conductivity, 80 percent.
 - (3) Tensile strength of 55,000 to 65,000 pounds per square inch.
- (c) ASTM B140/B140M, alloy B, half hard leaded red brass (hardware bronze), as specified in ASTM B16/B16M, ASTM B36/B36M, ASTM B121/B121M, and ASTM B124/B124M, alloy 360 or ASTM B36/B36M or ASTM B121/B121M, composition 260.

MIL-DTL-28754E

- (d) Beryllium copper as specified in ASTM B194, minimum 311 Knoop hardness.
- (e) Beryllium copper as specified in ASTM B194 and ASTM B196/B196M, ASTM B197/B197M, minimum 192 Knoop hardness.
- (f) Copper alloy sheet, UNS number C72500 in accordance with ASTM B122/B122M.

3.3.4.3 Contact plating. The contacts shall be plated as specified in 3.3.4.3.1 and 3.3.4.3.2.

3.3.4.3.1 Contact plating (see 3.1). All contacts shall be gold plated in accordance with type II, grade C, class 1 of MIL-DTL-45204 to a thickness of 50 microinches minimum. Contacts shall have a minimum nickel underplating of 50 microinches in accordance with SAE AMS-QQ-N-290, class 1. Localized finish specified by individual specification sheet.

3.3.4.3.2 Localized finish. When specified in the individual specification sheet, a localized finish may be used as an alternate to the overall plating specified in 3.3.4.3.1 (see 3.1).

3.3.5 Housing and cover (used on type V).

3.3.5.1 Housing and cover. The housing and cover shall be either die cast aluminum in accordance with SAE AMS-QQ-A-591, extruded aluminum alloy 6061 in accordance with SAE AMS-QQ-A-200/8, ASTM B308/B308M or non-aerospace use ASTM B241/B241M, ASTM B221, or sheet aluminum in accordance with SAE AMS-QQ-A-250/8, ASTM B928/B928M, or for non-aerospace ASTM B209. The type of aluminum used shall be suitable for the manufacturing technique employed.

3.3.5.2 Housing and cover finish. The housing and cover shall be anodized in accordance with MIL-A-8625. The basis metal shall be mechanically prefinished before anodizing to remove surface imperfections or roughness, and to assure uniformity of the finished surface. Minimum depth of anodic surface treatment shall be 0.0004 inch (0.010 mm).

3.3.5.3 Housing and cover finish color (see 3.1). The housing and cover finish shall be black within the color range established by color chips 34052, 34052, 36076, 36081, 37038, and 37056 of SAE-AMS-STD-595 (see 6.2). Where red is specified, the color range shall be established by color chips 11302, 21302, 22190 and 12199 of SAE-AMS-STD-595.

3.3.6 Screws. Hold-down screws, clamp screws, and other screws used in the connector shall be of passivated, corrosion-resistant steel in accordance with SAE AMS-QQ-S-763, classes 302, 304, and 305, condition A.

3.3.7 Cable clamp (used on type V). Cable clamps shall be steel in accordance with ASTM A827/A827M.

3.3.8 Keying pin (used on types IV and V). The keying pin shall be steel in accordance with ASTM A582/A582M.

3.3.9 Grounding. Grounding to the backplane shall be accomplished by one of the following methods (see 3.3.9.1 and 3.3.9.2).

3.3.9.1 Wrappost grounding (nail head). Wrappost grounding contact shall be beryllium copper in accordance with, ASTM B194, ASTM B196/B196M, ASTM B197/B197M minimum hardness Knoop 192.

MIL-DTL-28754E

3.3.9.2 Tuning fork grounding. The tuning fork contact shall be grounded through a bushing in accordance with SAE AMS-QQ-A-225/6, ASTM B211 for non-aerospace applications, SAE AMS4115, SAE AMS4116, SAE AMS4117, SAE AMS4128 SAE AMS-QQ-A-225/9 and finished in accordance with MIL-DTL-5541.

3.3.10 Pin shields. Individual pin shields shall be aluminum alloy 5052, H34, in accordance with SAE AMS-QQ-A-250/8 or for non-aerospace ASTM B209 and anodized black in accordance with MIL-A-8625, type III, class 2, dyed black (see 3.1) or unclad epoxy glass laminate in accordance with ASTM D1867, type FR-4.

3.4 Design and construction. Type IV and V connectors and component parts of all type connectors covered by this specification shall be of the design, construction and physical dimensions specified (see 3.1 and 6.2). Drawing interpretation shall be in accordance with ASME Y14.5. Type III connectors are composed of the base plate, insulator bushing, contacts, and associated hardware and when assembled is called a backplane (see 3.1). The grid pattern for type III, IV, and V connectors shall be 0.100 x 0.100 grid spacing.

3.4.1 Threaded parts. Unless otherwise specified (see 3.1), all threaded parts shall be in accordance with FED-STD-H28.

3.4.1.1 Engagement of threaded parts. All threaded parts shall engage by a length of at least 1 1/2 times the nominal diameter of the thread.

3.4.2 Connector assembly. No parts of the connector assembly shall be permanently displaced from their original fitted position upon (see 3.1) completion of the specified tests.

3.4.3 Contacts. Contacts for type III and V connectors shall be as specified (see 3.1), and shall permit individual insertion and removal from the insulator or insulator bushing. The contact shall provide a means of holding or locking it in its applicable insulator or insulator bushing.

3.4.3.1 Contact compliance. The contact shall assure proper operation without dependence on mechanical float, and to assure that minimum force (see 3.1) is transmitted to the connection joining the contact to the interconnecting material during mating and unmating. Contacts assembled to printed circuit boards shall neither move nor display looseness after assembly, nor during and after mate and unmate cycles.

3.4.3.2 Wrappost (used on type III). Wrappost shall be as specified in the individual specification sheets (see 3.1) and shall meet the wrappost requirements of MIL-STD-1130.

3.4.3.3 Crimp barrel. Crimp barrel shall be as specified in the individual specification sheet (see 3.1).

3.4.4 Inserts (used on type V). Type V connector inserts shall be interchangeable within the connector housing. To prevent improper assembly, inserts shall be polarized as specified (see 3.1).

3.4.4.1 Type IV connector inserts. Type IV connector inserts shall be fabricated as a solid dielectric (see 3.1).

3.4.4.2 Type V contact inserts. Type V contact insert assemblies shall be fabricated as either a solid single piece or a two piece solid dielectric. Both elements of a two piece insert assembly shall be polarized to insure that the assembly shall consist of one top and one bottom insert.

MIL-DTL-28754E

3.4.5 Base plate. The base plate shall be as specified, and shall have punched or drilled holes into which insulator bushings and contacts can be inserted and retained (see 3.1 and 3.4 when applicable).

3.4.6 Pin spacers. Pin spacers shall be as specified in the individual specification sheet (see 3.1).

3.5 Electrical performance requirements.

3.5.1 Insulation resistance. Connectors shall have the insulation resistance specified in table I when tested as specified in 4.7.1. Grounding bushings are not included in this test.

3.5.2 Low signal level contact resistance. Connectors shall not exceed a voltage drop 20 millivolts (mV) per mated contact pair when tested as specified in 4.7.2. Contact positions monitored for low signal level contact resistance shall be deleted from any test circuit which imposes a voltage in excess of 20 mV.

TABLE I. Insulation resistance.

Type	Resistance (megohms)					
	Contact to base plate			Contact to contact and contact to housing or card holder		
	Before Humidity	Measured either in chamber or within 1 hour after removal from chamber	After 4 hours drying	Before humidity	Measured either in chamber or within 1 hour after removal from chamber	After 4 hours drying
III	10,000	10	500			
IV				100,000	100	18,000
V				50,000	50	10,000

3.5.3 Contact resistance. Connectors shall not exceed the specified voltage drop value (see 3.1) when tested as specified in 4.7.3.

3.5.4 Crimp or solder joint resistance (type V). Crimp or solder terminated contacts shall not exceed 4 mV voltage drop between the wire and the contact when tested as specified in 4.7.4.

3.5.5 Grounding bushing resistance (type III). Mounting plate to contact resistance shall result in a voltage drop between the mounting plate and grounding contact not exceeding 20 mV when tested as specified in 4.7.5.

3.6 Mechanical performance requirements.

3.6.1 Engaging and separating forces (type III). The type III backplane shall exhibit the following engaging and separation forces when tested as specified in 4.8.1. Low insertion or standard insertion condition shall be specified by the specification sheet (see 3.1).

3.6.1.1 Standard insertion force. The engaging force shall be 6 ounces (1.6 newtons) maximum and the separating force shall be 2 ounces (0.56 newtons) minimum.

3.6.1.2 Low insertion force (LIF). The average engaging force shall be 2.25 ounces (0.63 newtons) maximum with random readings allowed to 4.00 ounces (1.12 newtons) maximum. Separation force shall be 4 ounces (1.12 newtons) maximum.

MIL-DTL-28754E

3.6.2 LIF normal force (type III). The average normal force shall be greater than 3.5 ounces (0.98 newtons) with random readings of less than 3.00 ounces (0.84 newtons) allowed when tested as specified in 4.8.2.

3.6.3 Wrappost torque (type III). The contact shall withstand a torque of 3 ounce-inches for the 0.100 grid spacings without permanent rotation relative to the mounting plate or relative to the bushing when tested as specified in 4.8.3.

3.6.4 Contact retention.

3.6.4.1 Type III connectors. No contact shall have been pushed out of its bushing, nor shall any bushing have been pushed out of the base plate when tested as specified in 4.8.4. There shall be no visible movement of the contact or bushing.

3.6.4.2 Type IV and V connectors. Each contact as mounted in the connector shall withstand an axial force of 7.5 pounds (33.4 newtons) in either direction for a minimum of 10 seconds when tested as specified in 4.8.4.

3.6.5 Termination tensile strength. When termination tensile strength is specified (see 3.1), terminated contacts are tested as specified in 4.8.5. They shall meet the tensile strength specified in table II.

TABLE II. Tensile strength.

Wire size	Round wire per axial load (pounds) wire	Flat cable axial load pounds per inch of cable width
16	50	N/A
18	30	N/A
20	20	N/A
22	12	100
24	8	75
26	5	50
28	2.7	N/A
30	1.5	N/A
32	1.0	N/A

3.6.6 Pin shield retention (types IV and V). The pin shield shall withstand, without separation from the connector assembly or damage to the pin shield, a force of 4.0 pounds (17.8 newtons) maintained for a minimum of 10 seconds when tested as specified in 4.8.6.

3.6.7 Fin or header torque (type IV). The connector assembly shall withstand a 6.00 inch-pound (0.68 newton-meters) torque (formats A and B) or a 25.0 inch-pound (2.8 newton-meters) torque (formats C, D and E) applied in both directions along the fin or header in a direction perpendicular to the plane of the fin or header without detrimental effect to the electrical or mechanical structure of the assembly when tested as specified in 4.8.7.

MIL-DTL-28754E

3.6.8 Fin or header cantilever load (type IV). The fin or header shall withstand a force of 2.0 pounds (8.9 newtons) (formats A and B) or 5.0 pounds (22.3 newtons) (formats C, D and E) applied perpendicular to the fin or header surface midway between the two extractor holes when tested as specified in 4.8.8.

3.6.9 Guide rib strength test (types IV and V). The individual ribs shall withstand a torque of 10.00 inch-pounds (1.13 newton-meters) maintained for a minimum of 10 seconds when tested as specified in 4.8.9. There shall be no detrimental effect to the mechanical structure of the connector assembly.

3.6.10 Solderability. When solderability is specified (see 3.1), the dipped surface of the terminal shall be 95 percent minimum covered with a continuous new solder coating when contacts are tested as specified in 4.8.10. Connectors shall have no cracks, blisters, discoloration, or physical distortion of the connector body or markings detrimental to connector performance.

3.6.11 Resistance to solvents. The connectors shall be visually inspected and shall show no evidence of cracking, crazing, discoloration, distortion or bleeding out of any matter from the material detrimental to connector performance after having been tested in accordance with 4.8.11. Pitting shall not be allowed. The marking and color coding shall be legible.

3.7 Environmental performance requirements.

3.7.1 Operating environmental performance requirements.

3.7.1.1 Current overload. The contact plated surface shall neither peel nor discolor when contacts are tested as specified in 4.9.1.1. The connectors shall meet the requirements of 3.5.3, 3.5.4, and 3.5.5.

3.7.1.2 Vibration. There shall be neither cracking nor breaking, nor shall there be any loosening of parts, nor other visible damage when mated connector assemblies are tested as specified in 4.9.1.2. There shall be no loss of electrical continuity of any of the contact circuits of more than 100 nanoseconds during the test. Connectors shall meet the requirements of 3.5.2, 3.5.3, 3.5.5, 3.6.1, 3.6.2, and 3.6.3.

3.7.1.3 Barometric pressure (reduced). There shall be neither evidence of cracks, burns, nor other visible, nor dimensional damage which could cause electrical or mechanical breakdown when tested as specified in 4.9.1.3. In addition, at the completion of the temperature-altitude test, the connector shall meet the requirements of 3.7.1.4 and 3.5.1 (pre-humidity).

3.7.1.4 Dielectric withstanding voltage. There shall be neither evidence of arcing, breakdown, nor damage when unmated connector assemblies are tested as specified in 4.9.1.4.

3.7.1.5 Shock (specified pulse). There shall be neither breakage nor loosening of contacts, cracking of inserts, nor other visible or dimensional damage which would cause electrical or mechanical breakdown when mated connectors are tested as specified in 4.9.1.5. There shall be no loss of electrical continuity of any of the contact circuits of more than 100 nanoseconds during test.

3.7.2 Non-operating environmental performance requirements.

3.7.2.1 Temperature cycling. Mated connector assemblies shall show neither evidence of cracking, fracture nor other damage detrimental to the function of the connector when tested as specified in 4.9.2.1.

3.7.2.2 Durability. There shall be no evidence of mechanical degradation that would adversely affect the connector's ability to function, and the voltage drop shall not exceed the specified value (see 3.1) when

MIL-DTL-28754E

mated connectors are tested as specified in 4.9.2.2. In addition, after completion of the test, type III connectors shall meet the requirements of 3.6.1 and 3.6.2.

3.7.2.3 Salt spray (corrosion). There shall be neither visual signs of corrosion nor corrosive salts on the basic metal when connectors are tested as specified in 4.9.2.3. Connectors shall meet the requirements of 3.5.2, 3.5.3 and 3.5.5.

3.7.2.4 Humidity. The connector shall meet the requirements of 3.5.1, 3.5.2, 3.7.1.4 and 3.6.4 when tested as specified in 4.9.2.4.

3.8 Assembly of contact and bushing sets (type III only). The contact and bushing sets when installed into the plate assembly shall satisfy the workmanship standards established on figure 1, when visually inspected at a magnification of 10 power. Contacts shall be installed in the bushing in such a manner that contacts are flush or below the top surface. Bushings shall be free of damage on top surface, and the configuration shall conform to the appendix. Figure 1A is a preferred condition. Figures 1B and 1C are unacceptable conditions. If more than 5 percent of the bushings display any conditions depicted on figures 1D through 1I, the plate is unacceptable.

3.9 Marking. Unless otherwise specified (see 3.1) connectors and component parts shall be permanently and legibly marked with the military part number, contact numbers, date code and manufacturer's source code in accordance with MIL-STD-1285. Other markings which in any way interfere with, obscure, or confuse those specified herein, are prohibited. All markings shall be made using epoxy base ink in accordance with A-A-56032 and shall remain legible after all tests. For components too small to mark, marking shall be on the packaging material (see 5.1). Unless otherwise specified in the applicable specification sheet (see 3.1), use contrasting colors.

3.10 Workmanship. The workmanship on connectors supplied under this specification shall assure conformance with the requirements contained herein. The contacts shall be free of burrs and sharp corners which would otherwise damage the plating when mating the connectors. Contacts and the connector body shall be free of cracks, voids, irregularities, and so forth. Housing cable clamps, hold down screws and inserts shall be free of burrs, sharp edges, and flash.

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 assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 4. 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.

MIL-DTL-28754E

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

- (a) First article inspection (see [4.4](#)).
- (b) Conformance inspection (see [4.5](#)).

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performance in accordance with the test conditions specified in 4.3.1, MIL-STD-202, and EIA-364.

4.3.1 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 contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with NCSL Z540.3.

4.4 First article inspection. First article inspection shall be performed at laboratory acceptable to the government on sample units produced with equipment and procedures normally used in production. First article inspection shall consist of the examinations and tests specified in [table III](#) on test samples specified in [4.4.1](#).

MIL-DTL-28754E

TABLE III. First article inspection.

Inspection	Connector type			Requirement paragraph	Method paragraph	Number of units to be inspected	Number of defectives allowed
	III	IV	V				
<u>Subgroup I</u>							
Visual and mechanical examination	X	X	X	3.1, 3.3, 3.4, 3.8, 3.9, 3.10	4.6	12 <u>1</u> / 3 <u>2</u> /	0
Dielectric withstanding voltage	X	X	X	3.7.1.4	4.9.1.4		
Insulation resistance	X	X	X	3.5.1	4.7.1		
Low signal level contact resistance	X	X	X	3.5.2	4.7.2		
Contact resistance	X	X	X	3.5.3	4.7.3		
Crimp or solder joint resistance			X	3.5.4	4.7.4		
Grounding bushing resistance	X			3.5.5	4.7.5		
Engaging and separating forces	X			3.6.1	4.8.1		
Normal force (LIF only)	X			3.6.2	4.8.2		
Wrappost torque	X			3.6.3	4.8.3		
Contact retention	X	X	X	3.6.4	4.8.4		
Resistance to solvents	X	X	X	3.6.11	4.8.11		
<u>Subgroup II</u>							
Temperature cycling	X	X	X	3.7.2.1	4.9.2.1	4 <u>1</u> / 1 <u>2</u> /	0
Current overload	X	X	X	3.7.1.1	4.9.1.1		
Contact resistance	X	X	X	3.5.3	4.7.3		
Grounding bushing resistance	X			3.5.5	4.7.5		
Crimp or solder joint resistance			X	3.5.4	4.7.4		
Vibration	X	X	X	3.7.1.2	4.9.1.2		
Low signal level CR	X	X	X	3.5.2	4.7.2		
Contact resistance	X	X	X	3.5.3	4.7.3		
Grounding bushing resistance	X			3.5.5	4.7.5		

MIL-DTL-28754E

TABLE III. First article inspection – Continued.

Inspection	Connector type			Requirement paragraph	Method paragraph	Number of units to be inspected	Number of defectives allowed		
	III	IV	V						
<u>Subgroup II (continued)</u>									
Engaging and separating forces	X			3.6.1	4.8.1	4 $\frac{1}{1}$ / 1 $\frac{2}{2}$ /	0		
Normal force (LIF only)	X			3.6.2	4.8.2				
Contact retention	X	X	X	3.6.4	4.8.4				
Pin shield retention		X	X	3.6.6	4.8.6				
Visual examination	X	X	X	3.1, 3.4, 3.8, 3.9, 3.10	4.6				
<u>Subgroup III</u>									
Durability	X	X	X	3.7.2.2	4.9.2.2				
Engaging and separating forces	X			3.6.1	4.8.1				
Normal force (LIF only)	X			3.6.2	4.8.2				
Wrappost torque	X			3.6.3	4.8.3				
Contact retention	X	X	X	3.6.4	4.8.4				
Salt spray (corrosion)	X	X	X	3.7.2.3	4.9.2.3				
Low signal level CR	X	X	X	3.5.2	4.7.2				
Contact resistance	X	X	X	3.5.3	4.7.3				
Grounding bushing resistance	X			3.5.5	4.7.5				
Visual and mechanical examination	X	X	X	3.1, 3.4, 3.8, 3.9, 3.10	4.6				
<u>Subgroup IV</u>									
Shock (specified pulse)	X	X	X	3.7.1.5	4.9.1.5				
Insulation resistance	X	X	X	3.5.1	4.7.1				
Humidity	X	X	X	3.7.2.4	4.9.2.4				
Low signal level CR	X	X	X	3.5.2	4.7.2				
Insulation resistance	X	X	X	3.5.1	4.7.1				
Dielectric withstanding voltage	X	X	X	3.7.1.4	4.9.1.4				
Contact retention	X	X	X	3.6.4	4.8.4				

MIL-DTL-28754E

TABLE III. First article inspection – Continued.

Inspection	Connector type			Requirement paragraph	Method paragraph	Number of units to be inspected	Number of defectives allowed
	III	IV	V				
<u>Subgroup IV (continued)</u>							
Pin shield retention		X	X	3.6.6	4.8.6	4 <u>1</u> / 1 <u>1</u> /	0
Fin or header torque		X		3.6.7	4.8.7		
Fin cantilever load		X		3.6.8	4.8.8		
Guide rib strength test		X	X	3.6.9	4.8.9		
Barometric pressure (reduced)		X	X	3.7.1.3	4.9.1.3		
Dielectric withstanding voltage		X	X	3.7.1.4	4.9.1.4		
Insulation resistance		X	X	3.5.1	4.7.1		
Visual examination	X	X	X	3.1, 3.4, 3.8, 3.9, 3.10	4.6		
<u>Subgroup V</u>							
Visual and mechanical examination	X	X	X	3.1, 3.3, 3.4, 3.8, 3.9, 3.10	4.6	20 contacts	0
Termination tensile strength			X	3.6.5	4.8.5		
<u>Subgroup VI</u>							
Visual and mechanical examination		X	X	3.1, 3.3, 3.4, 3.8, 3.9, 3.10	4.6	1	0
Solderability			X	3.6.10	4.8.10		

1/ Indicates inspection quantity for type IV, V connectors only.

2/ Indicates inspection quantity for type III connectors only.

4.4.1 Sample. The sample required for first article shall be prepared in accordance with the [appendix](#). Inspection shall be the on the sample quantity listed in [table XI](#). One hundred percent inspection shall be performed in [table XI](#) for procurement less than the listed the sample quantity.

4.4.2 Failure. Failures in excess of those allowed in [table III](#) shall result in refusal to grant first article approval.

MIL-DTL-28754E

4.5 Conformance inspection.

4.5.1 Group A inspection. Group A inspection shall be conducted by the contractor and shall consist of the inspections specified in table IV.

TABLE IV. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph
Visual and mechanical	3.1, 3.3, 3.4, 3.8, 3.9, 3.10	4.6

4.5.1.1 Group B inspection. Group B inspection shall be conducted by the contractor and shall consist of the inspections specified in table V, in the order shown.

TABLE V. Group B inspection.

Inspection	Requirement paragraph	Test method paragraph
Contact resistance	3.5.3	4.7.3
Grounding bushing resistance (type III)	3.5.5	4.7.5
Engaging and separating forces (type III)	3.6.1	4.8.1
Normal force (LIF only)	3.6.2	4.8.2
Insulation resistance	3.5.1	4.7.1
Contact retention	3.6.4	4.8.4

4.6 Visual and mechanical methods of examination and test. Connectors shall be examined to determine that the material, design, construction, physical dimensions, marking and workmanship are in accordance with the applicable requirements (see 3.1, 3.3, 3.4, 3.8, 3.9, and 3.10).

4.7 Electrical tests.

4.7.1 Insulation resistance. The unmated connectors shall be tested in accordance with EIA/ECA-364-21 and shall meet the requirements of 3.5.1. The following details shall apply:

- (a) Test voltage: 100 Vdc plus or minus 5 percent.
- (b) Points of measurement:
 - Type III – Contact to base plate.
 - Types IV and V – Contact to contact and contact to housing or card holder.

4.7.2 Low signal level contact resistance. Connectors shall be tested in accordance with EIA-364-23 and shall meet requirements of 3.5.2. Test probes should be no more than 0.06 inch (1.52 mm) from the surface of the connector housing.

4.7.3 Contact resistance. Connectors shall be wired and tested in accordance with EIA-364-06 and shall meet requirements of 3.5.3. The following details and exceptions shall apply:

- (a) Method of connection (see figure 2).

MIL-DTL-28754E

- (b) Test current shall be 3 amperes, unless otherwise specified (see 3.1).
- (c) Number of activations prior to measurement: 1.
- (d) Number of test activations: 1.
- (e) Number of measurements per activation: 1.

4.7.4 Crimp or solder joint resistance. Connectors with crimp or solder terminated contacts (see 3.1) shall be wired and tested in accordance with EIA-364-06 and shall meet requirements of 3.5.4. The following details and exceptions shall apply:

- (a) Method of connection (see figure 3).
- (b) Test current (see 3.1).
- (c) Number of measurements per activation: 1.

4.7.5 Grounding bushing resistance (type III). Resistance shall be tested as shown on figure 4 and shall meet the requirements of 3.5.5. The test current shall be 3 amperes.

4.8 Mechanical tests.

4.8.1 Engaging and separating forces (type III). The engaging and separating forces should be determined in accordance with EIA-364-37. The test blade on figure 5 shall be inserted into 50 different contacts to a depth of 0.160 inch (4.064 mm), and the engaging and separating forces recorded. The average and maximum forces shall meet the requirements of 3.6.1.

4.8.2 LIF normal force (type III). The force exerted by 50 different contacts shall be measured. All measurements shall be performed on contact sets which were tested under 4.8.1. Normal force shall be measured using equipment which directly indicates the force exerted by each time or the average force exerted by both times when the gap between the contact points is 0.020 plus or minus 0.0002 inch. Any equipment used for these measurements must be capable of direct correlation with normal force measurements using conventional force versus deflection techniques. The average and minimum normal forces shall meet the requirements of 3.6.2.

4.8.3 Wrappost torque (type III). The assembled contact and bushing shall be tested in accordance with MIL-STD-202-211, test condition E, and shall meet the requirements of 3.6.3.

4.8.4 Contact retention. Connectors shall be tested in accordance with EIA/ECA-364-29 and shall meet the requirements of 3.6.4. The following details and exceptions shall apply:

- (a) Number of samples – A minimum of 10 contacts per test specimen shall be tested.
- (b) Applied axial load – One pound per second until a 7 1/2 pound load has been reached. Maintain load for 10 seconds (when hook-up wire is used, the wire shall be large enough to withstand the applied load.)
- (c) Maximum allowable contact displacement during application and after removal of specified force – No visible movement (at 3X) of the contact or bushing.
- (d) Axial direction – Straight.

4.8.5 Termination tensile strength (type V). Contacts shall be tested in accordance with EIA-364-08 and shall meet the requirements of 3.6.5.

4.8.5.1 Termination tensile strength (round wire, type V connector only). The axial load specified in

MIL-DTL-28754E

[table II](#) (see [3.6.5](#)) shall be applied to each individual wire. Samples of the terminated contact-wire shall be placed in a tensile testing device and sufficient force applied to pull the wire out of the contact or to break the wire. The terminated joint of the contact shall not break or become distorted before the minimum tensile strength specified is reached. The speed of head travel of the tensile device shall be 1 plus or minus 0.25 inch (25.4 plus or minus 6.4 mm) per minute.

4.8.5.2 Termination tensile strength (flat conductor cable only, type V connector). Unmated connectors shall be tested in accordance with EIA-364-08 and shall meet the requirements of [3.6.5](#). The following details and exceptions shall apply:

- (a) Axial force shall be in accordance with [table II](#) and shall be applied uniformly across the width of the cable.
- (b) The cable shall be clamped 6 inches from the mating face of the assembly.

4.8.6 Pin shield retention (types IV and V). Each pin shield shall withstand without separation from its base a force 4 pounds (18 newtons), minimum and shall meet the requirements of [3.6.6](#). The force shall be applied to each end of each pin shield in a direction normal to a plane passing through the centerline of both keying pins. The point of application of force shall be midway between the first and second electrical contacts on each end and up to 0.06 plus 0.00, minus 0.03 inch (1.52 plus 0.0, minus 0.76 mm) from the bottom edge of the pin shield. The rate of application of force shall be such that the specified force is obtained in 2 to 5 seconds; the force shall be maintained for 10 to 15 seconds at 25 plus or minus 5°C (see [figure 6](#)). For multiple span connectors having rows with 50 contacts, the foregoing tests are also required at points opposite the midpoint between contacts 25 and 26 and between 75 and 76, or 125 and 126, or 175 and 176, or 225 and 226.

4.8.7 Fin or header torque (type IV). The connector assembly shall be mounted in a fixture which restrains the movement of the base of the connector assembly (see [figures 7](#) and [8](#)). Formats A and B will be restrained for 0.5 inches (12.7 mm) maximum from the assembly base, formats C, D, and E will be restrained 1.0 inch (25.4 mm) maximum from the assembly base. The fixture piece shown on [figure 7](#) is only meant as an example of what can be used for formats A and B (with fin). The torque as specified in [3.6.7](#) shall be applied to the fin or header in each of two opposing directions. The torque shall be applied at a rate so that the specified torque is obtained in 2 to 10 seconds from the time the torque is first applied to the fin or header.

4.8.8 Fin or header cantilever load (type IV). With the connector assembly restrained as specified in 4.8.7, apply the force specified in [3.6.8](#) at the center of the extractor fin or header along the centerline between the two extractor holes and perpendicular to the plane of the fin or header in two directions (see [figure 9](#)). The specified force shall be obtained in 2 to 10 seconds from the time the force is first applied.

4.8.9 Guide rib strength test (types IV and V). The torque specified in [3.6.9](#) shall be applied in a direction perpendicular to the plane of the ribs and along the full length of the rib using a method similar to that shown on [figure 10](#). The torque shall be applied at a rate so that the specified force is obtained in 2 to 10 seconds from the time the force is first applied to the guide rib.

4.8.10 Solderability (types IV and V). Terminals shall be tested in accordance with MIL-STD-202-208 and shall meet the requirements of [3.6.10](#).

MIL-DTL-28754E

4.8.11 Resistance to solvents. Connectors shall be tested in accordance with EIA-364-11 and shall meet the requirements of 3.6.11. The solvent shall be Class I. The connectors tested shall be fully assembled by normal assembly operation.

4.9 Environmental tests.

4.9.1 Operating environmental tests.

4.9.1.1 Current overload.

4.9.1.1.1 Mated contacts. Mated contacts shall be subjected to current overloads of 125 percent of rated current (see 3.1) for 2 hours, and 150 percent of rated current of contacts for 5 minutes. After being cooled to room temperature, connectors shall be tested in accordance with 4.7.3 and shall meet the requirements of 3.7.1.1.

4.9.1.1.2 Crimped or solder joint. The wired crimped or solder joint shall be subjected to current overloads of 125 percent of rated current (see 3.1) for 2 hours, and 150 percent of rated current of contacts for 5 minutes. After being cooled to room temperature, connectors shall be tested in accordance with 4.7.4 and shall meet the requirements of 3.7.1.1.

4.9.1.1.3 Mounting plate to contact. The mounting plate to contact joint shall be subjected to current overloads of 125 percent of rated current (see 3.1) for 2 hours, and 150 percent of rated current of contacts for 5 minutes. After being cooled to room temperature, connectors shall be tested in accordance with 4.7.5 and shall meet the requirements of 3.7.1.1.

4.9.1.2 Vibration. Mated connector assemblies shall be tested in accordance with EIA-364-28 and shall meet the requirements of 3.7.1.2. The following details and exceptions shall apply:

- (a) Test conditions III and VE.
- (b) Duration of the random vibration test, level VE, shall be 15 minutes per axis.

4.9.1.3 Barometric pressure (reduced). The connector shall be tested in accordance with MIL-STD-202-105, condition D, and meet the requirements of 3.7.1.3. During the last half hour, 30 Vdc shall be applied between adjacent contacts.

4.9.1.4 Dielectric withstanding voltage. Connector assemblies shall be tested in accordance with EIA-364-20, test condition IV and shall meet the requirements of 3.7.1.4. The following details shall apply:

- (a) Magnitude of test voltage and nature of potential – 350 Vac rms at 60 Hz or 500 Vdc.
- (b) Points of application of test voltage:
Type III – Contact and base plate.

4.9.1.5 Shock (specified pulse). Connectors shall be tested in accordance with EIA-364-27 and shall meet the requirements of 3.7.2.2. The following details and exceptions shall apply:

- (a) Test condition G.
- (b) Measurements during and after test – The mated connector assemblies shall be monitored for electrical discontinuity by a method which shall at least be sensitive enough to monitor or register, automatically, any electrical discontinuity of 100 nanoseconds.

MIL-DTL-28754E

4.9.2 Non-operating environmental tests.

4.9.2.1 Temperature cycling. Connectors, wired (when applicable) and mated, shall be tested in accordance with EIA-364-32 and shall meet the requirements of 3.7.2.1. The following details and exceptions shall apply:

- (a) Test condition letter – A, except maximum temperature extreme shall be 125°C.
- (b) Measurements before and after cycling – Not applicable.

4.9.2.2 Durability. Connector assemblies complete with wire, contacts, applicable hoods, clamp and associated hardware shall be subjected to 500 cycles of mating and unmating in accordance with EIA-364-09. Testing of connectors shall be not greater than 500 cycles per hour. Connectors shall then be tested in accordance with 4.8.1 and 4.8.2. Following this test, mated connectors shall meet the requirements of 3.7.2.3.

4.9.2.3 Salt spray (corrosion). Connectors shall be tested in accordance with EIA/ECA-364-26 and shall meet the requirements of 3.7.2.4. The following details and exceptions shall apply:

- (a) Applicable salt solution – 5 percent.
- (b) Test condition letter – B.
- (c) Conditioning after exposure – All exposed surfaces of connectors shall be thoroughly washed and dried in a circulating air oven at a temperature of 38 plus or minus 3°C.
- (d) Measurements after exposure – Connectors shall be tested in accordance with 4.7.2, 4.7.3, 4.7.5, and 4.8.3.

4.9.2.4 Humidity. The test sample shall be humidity tested in accordance with EIA-364-31, method V and shall meet the requirements of 3.7.2.4. Following the test, connectors shall be tested in accordance with 4.7.1, 4.9.1.4 and 4.8.4.

4.10 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirement shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor 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 Service or Defense Agency, or within the military Department's services system commands. Packaging data retrieval is available from the managing Military Department 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 explanatory nature that may be helpful but is not mandatory.)

MIL-DTL-28754E

6.1 Intended use. Connectors and component parts covered by this specification are intended for use in ground support, airborne, 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) Title, number, and date of the applicable specification sheet and the complete part number (see 3.1).
- (c) Issue of ASSIST to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.2).
- (d) Color (see 3.3.5.3).
- (e) Dimensions of base plate and exact number and size of plug connector which the base plate of the type III connector will accommodate (see 3.4).
- (f) Marking, levels of preservation and packaging and packing required (see 5.1).
- (g) Tools if required (see 3.1).
 - (1) Insertion and withdrawal tools.
 - (2) Crimp tool and positioner.
- (h) If requested, original equipment manufacturer (OEM) drawing showing actual dimensions.
- (i) First article contract requirements.

6.3 Current-carrying capacity. The current rating given in the specification sheets are for single contacts. It is necessary to derate the total current carrying capacity of a connector.

6.4 Shipment of contacts. At the option of the contracting officer, contacts may be mounted on a carrier, or delivered loose in bulk.

6.5 Intermetallic contact. The finishing of metallic areas to be placed in intimate contact by assembly presents a special problem, since intermetallic contact of dissimilar metals results in electrolytic couples which promote corrosion through galvanic action. To provide the required corrosion protection, intermetallic couples are restricted to those permitted in table VI. Table VI shows metals and alloys (or plates) by groups which have common electromotive forces (EMF) within 0.05 volt when couples with a saturated calomel electrode in sea water at room ambient temperatures. All members of a group are considered as completely compatible, one with the other. Compatible couples between groups have been specified in table VI based on a potential difference of 0.25 volt maximum. To simplify any arithmetic involved, table VI shows, in addition to EMF against a calomel electrode, a derived anodic index with group 1 (gold, and so forth) as 0 and group 18 (magnesium, and so forth) as 175. Subtraction of a lower group anodic index gives the EMF difference in hundredths of a volt.

6.5.1 Groups. Table VI lists 18 primary groups. It may be noted that neither the metallurgical similarity or dissimilarity of metals is the parameter for selection of compatible couples. All members within a group, regardless of metallurgical similarity, are considered inherently nonsusceptible to galvanic action, when coupled with any member within the group; for example, such dissimilar metals are platinum and gold. Similarly, such basically dissimilar alloys as austenitic stainless steels, silver-silver, and low brass (all members of group 5) are inherently nonsusceptible when coupled together.

MIL-DTL-28754E

TABLE VI. Compatible groups 1/

Group no	Metallurgical category	EMF (V)	Anodic index (0.01 V)	Compatible couples
1	Gold, solid and plated; gold-platinum alloys, wrought platinum (most cathodic)	+015	0	○
2	Rhodium plated on silver-plated copper	+ 005	10	●○
3	Silver, solid or plated, high silver alloys	0	15	●○
4	Nickel, solid or plated; monel metal, high nickel-copper alloys	-015	30	●○
5	Copper, solid or plated; low brasses or bronzes, silver solder; German silver; high copper-nickel alloys, nickel-chromium alloys, austenitic corrosion-resistant steels	-020	35	●○
6	Commercial yellow brasses and bronzes	-025	40	●○
7	High brasses and bronzes, naval brass; Muntz metal	-030	45	●○
8	18 percent chromium type corrosion- resistant steels	-035	50	●○
9	Chromium plated; tin, plated, 12 percent chromium type corrosion-resistant steels	-045	60	●○
10	Tin-plate, terneplate, tin-lead solder	-050	65	●○
11	Lead, solid or plated, high lead alloys	-055	70	●○
12	Aluminum, wrought alloys of the duralumin type	-060	75	●○
13	Iron, wrought, gray, or malleable, plain carbon and low alloy steels, Armco iron	-070	85	●○
14	Aluminum, wrought alloys other than duralumin type, aluminum, cast alloys of the silicon type	-075	90	●○
15	Aluminum, cast alloys other than silicon type, cadmium, plated and chromated	-080	95	●○
16	Hot-dip-zinc plate, galvanized steel	-105	120	●○
17	Zinc, wrought, zinc-based die-casting alloys, zinc, plated	-110	125	●○
18	Magnesium and magnesium-base alloys cast or wrought (most anodic)	-160	175	●

1/ Compatible couples – potential difference of 0.25 volt maximum between groups.

6.5.2 Compatibility graphs. Permissible couple series are shown in table VI by the graphs at the right. Members of groups connected by lines will form permissible couples. A “○” indicates most cathode member of each series, a “●” an anodic member, and the arrow indicates the anodic direction.

6.5.3 Selection of compatible couples. Proper selection of metals in the design of equipment will result in fewer intermetallic contact problems. For example, for sheltered exposure, neither silver nor tin require protective finishes. However, since silver has an anodic index of 15 and tin 65, the EMF generated as a couple is 0.50 volt, which is not allowable in table VI. In this case, other metals or plates will be required. It should be noted that, in intermetallic couples, the member with the higher anodic index is anodic to the member with the lower anodic index and will be susceptible to corrosion in the presence of an electrolytic medium. If the surface area of the cathodic part is significantly greater than that of the anodic part, the corrosive attack on the contact area of the anodic part may be greatly intensified.

MIL-DTL-28754E

Material selection for intermetallic contact parts, therefore, should establish the smaller part as the cathodic member of the couple, whenever practicable.

6.5.4 Plating. When base metals intended for intermetallic contact form couples not allowed in [table VI](#), they are to be plated with those metals which will reduce the potential difference to that allowed in [table VI](#).

6.6 Quality conformance inspection.

6.6.1 Inspection lot. An inspection lot should consist of all connectors having the same number and size of contacts, of the same type and contact spacing, or their component parts, whichever is being procured, produced under essentially the same conditions and offered for inspection at one time.

6.6.2 Group A inspection.

6.6.2.1 Rejected lots. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots should be inspected using tightened inspection. Such lots should be separate from new lots, and should be clearly identified as reinspected lots.

6.6.3 Group B inspection.

6.6.3.1 Rejected lots. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots should be inspected using tightened inspection. Such lots should be separate from new lots, and should clearly be identified as reinspected lots.

6.6.3.2 Disposition of sample units. Sample units which have been subjected to group B inspection may be delivered on the contract or purchase order, if the lot is accepted.

6.7 Subject term (key word) listing.

Backplane
Cable
Contacts
First Article Test (FAT)
Module

6.8 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.

MIL-DTL-28754E

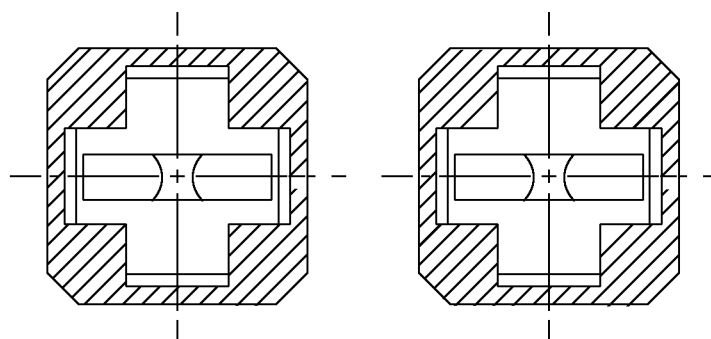


FIGURE 1A - Idealized condition.

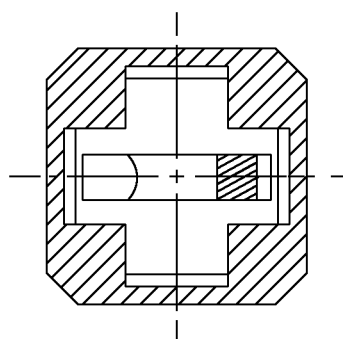


FIGURE 1B - Either line broken

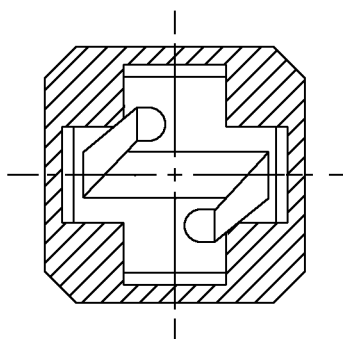


FIGURE 1C - Both contact tines twisted

FIGURE 1. Contact and bushing set workmanship standards.

MIL-DTL-28754E



FIGURE 1D - Single contact line twisted.

FIGURE 1E - Contact lines against bushing.

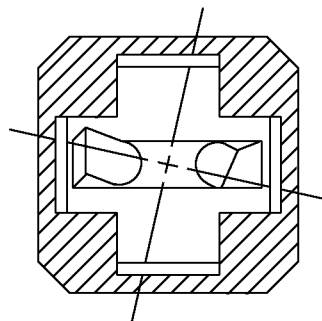


FIGURE 1F - Bushing rotated and contact lines twisted.

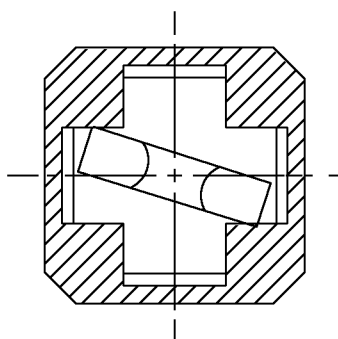


FIGURE 1G - Contact orientation not central to cruciform and contact lines bridging bushing.

FIGURE 1. Contact and bushing set workmanship standards – Continued.

MIL-DTL-28754E

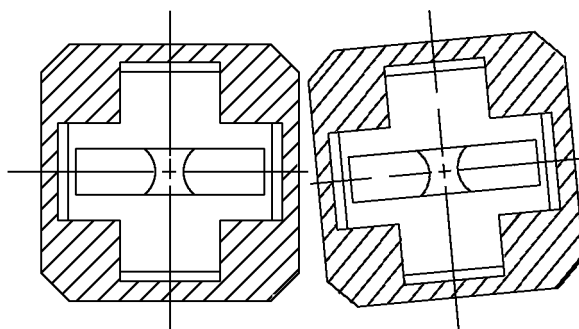


FIGURE 1H - Bushing and contacts with one set improperly oriented

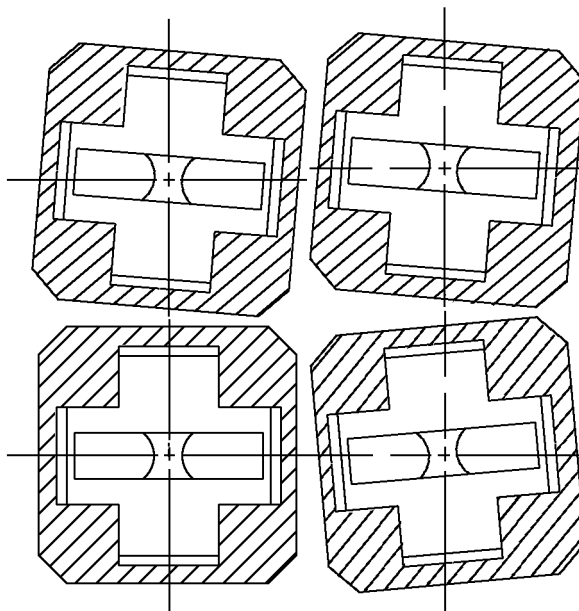
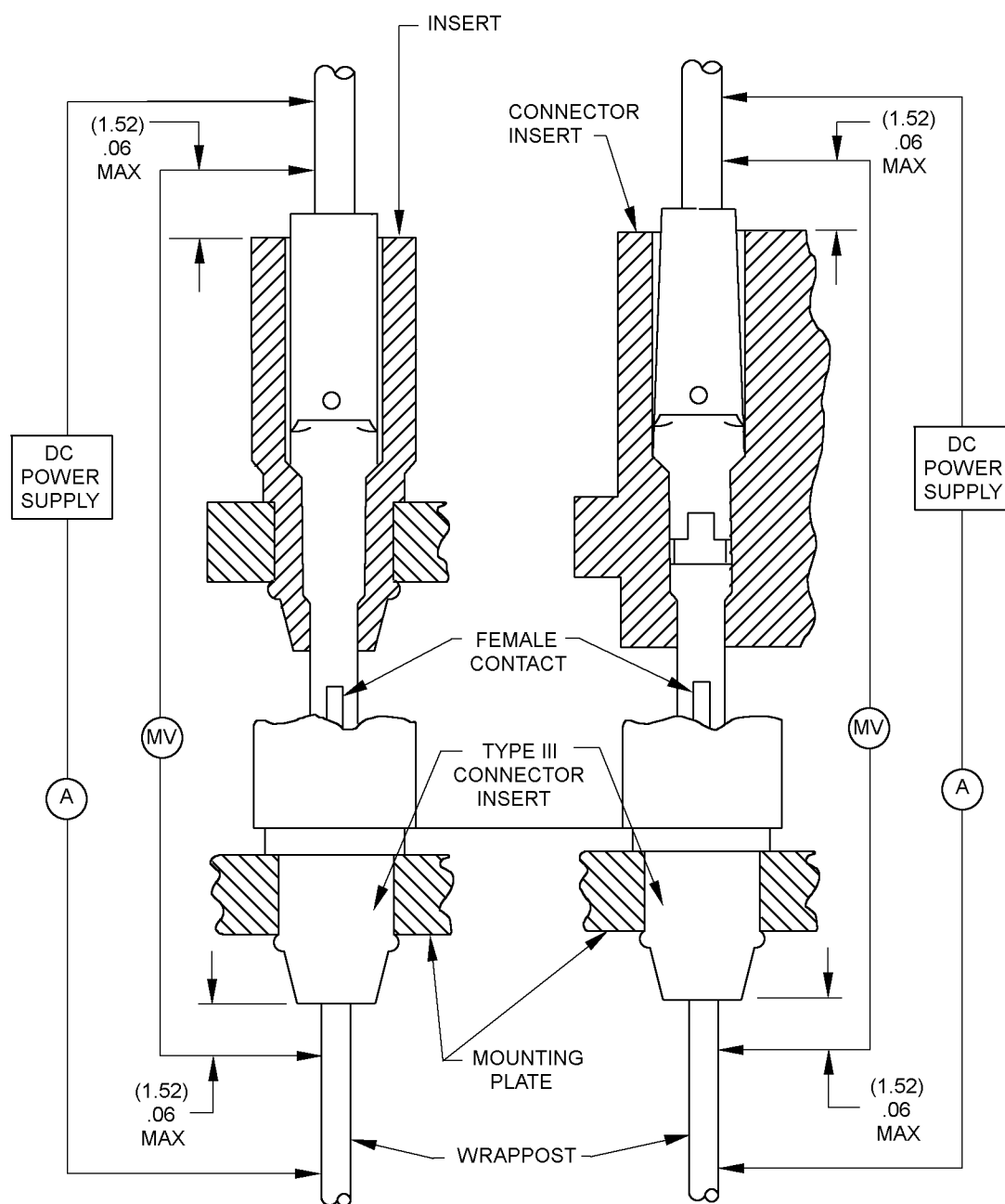


FIGURE 1I - Bushing and contacts randomly oriented in pattern

FIGURE 1. Contact and bushing set workmanship standards – Continued.

MIL-DTL-28754E

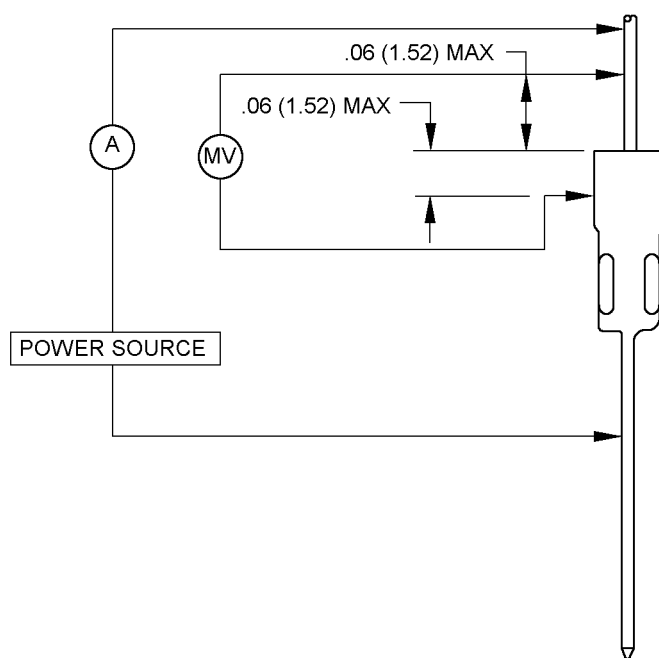


NOTES

1. Dimensions are in inches.
2. Metric equivalents are in parentheses and are given for general information only.

FIGURE 2. Test setup for measuring mated contact resistance.

MIL-DTL-28754E

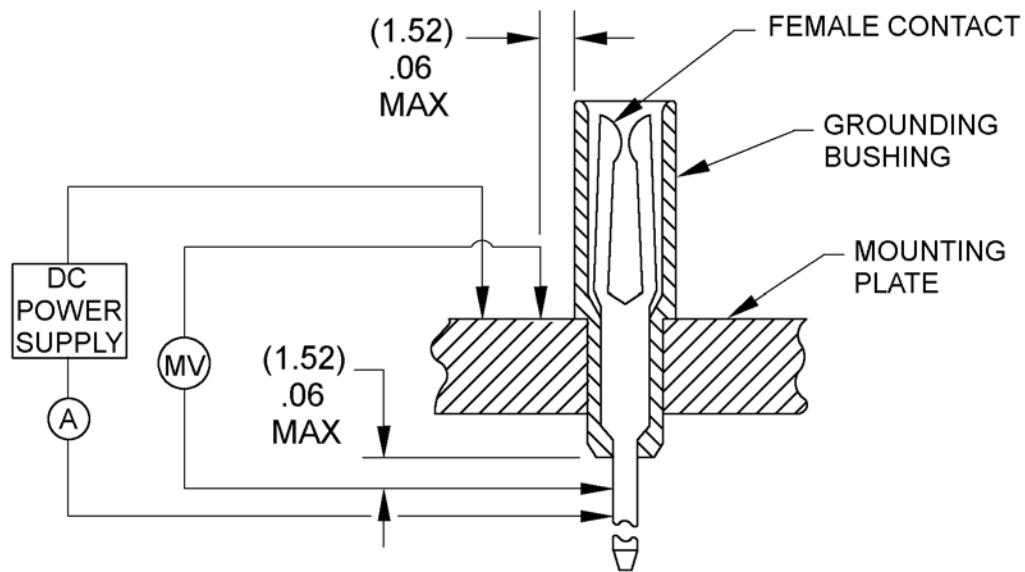


NOTES

1. Dimensions are in inches.
2. Metric equivalents are in parentheses and are given for general information only.

FIGURE 3. Test setup for measuring crimp or solder joint resistance.

MIL-DTL-28754E

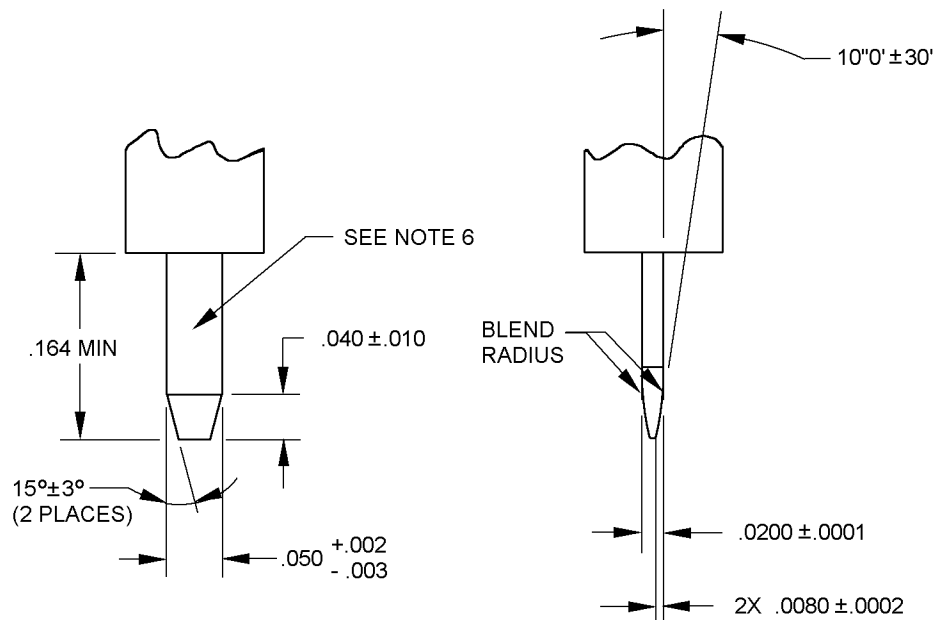


NOTES

1. Dimensions are in inches.
2. Metric equivalents are in parentheses and are given for general information only.

FIGURE 4. Test setup for measuring mounting plate to contact resistance.

MIL-DTL-28754E



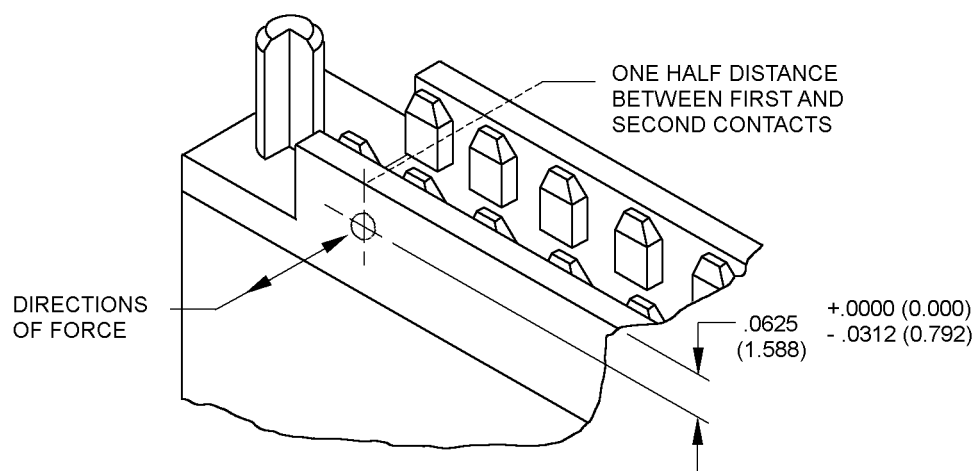
INCHES	MM	INCHES	MM
0.0001	0.003	0.010	0.25
0.0002	0.005	0.0200	0.508
0.002	0.05	0.040	1.02
0.003	0.08	0.050	1.27
0.0080	0.203	0.164	4.17

NOTES

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Material: Hardened tool steel (hardness: Knoop 542-630).
4. Alternate material: Tungsten Carbide (hardness: Rockwell "A" 89.5-93.0).
5. Surface finish: 4-8, microinch Ra on working surfaces in accordance with ASME B 46.1.
6. Grinding to be in the direction of blade movement during test.

FIGURE 5. Contact engaging and separating, test blade.

MIL-DTL-28754E



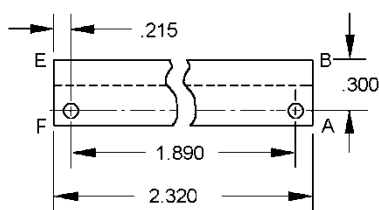
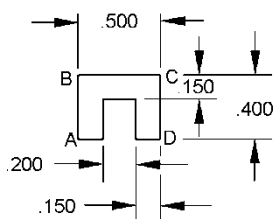
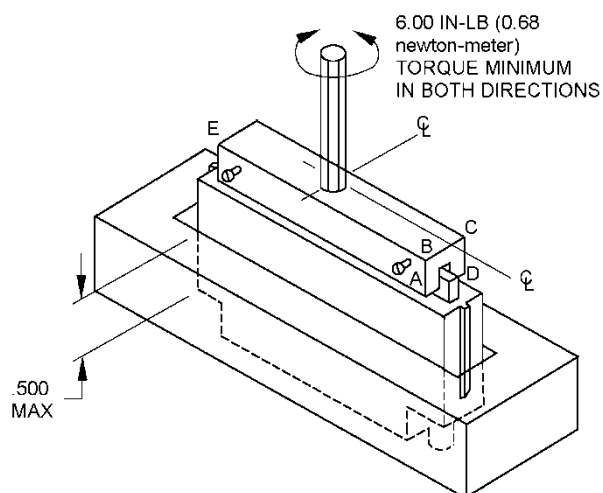
NOTES

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Metric equivalents are in parentheses.
4. On connectors having rows with 20 contacts, the force is applied at four different points for a total of eight measurements. On connectors with rows of 50 contacts, the force is applied at six different points for a total of 12 measurements.

FIGURE 6. Pin shield retention test.

MIL-DTL-28754E

INCHES	MM
0.150	3.81
0.200	5.08
0.215	5.46
0.300	7.62
0.400	10.16
0.500	12.70
1.890	48.01
2.320	58.93



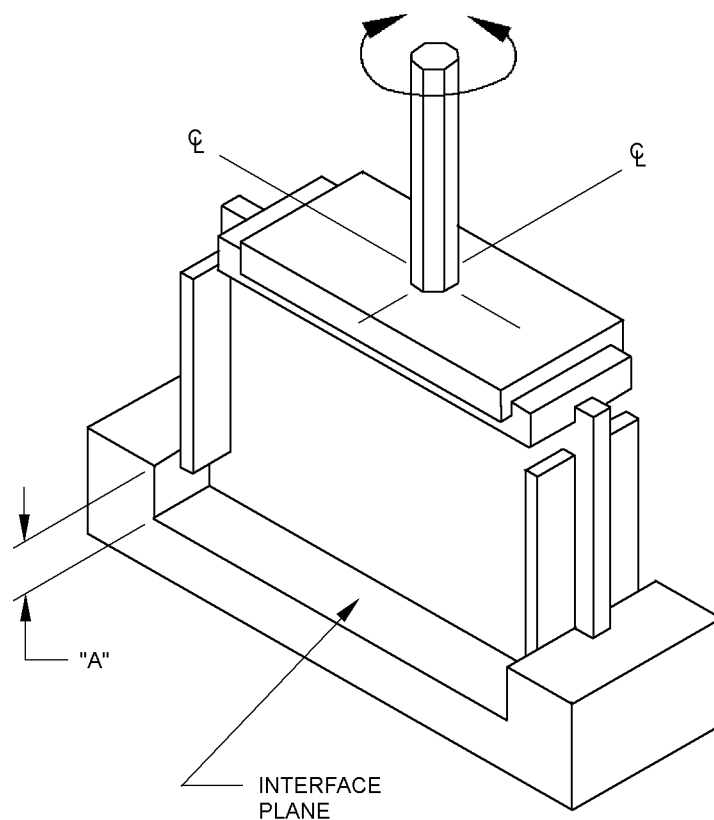
NOTES:

1. Dimensions are in inches.
2. Metric equivalents are in parentheses and are given for general information only.

FIGURE 7. Fin or header torque (formats A and B).

MIL-DTL-28754E

Format C, D, E 25.0 in – lb (2.8 newtons – meter)
Torque minimum in both directions



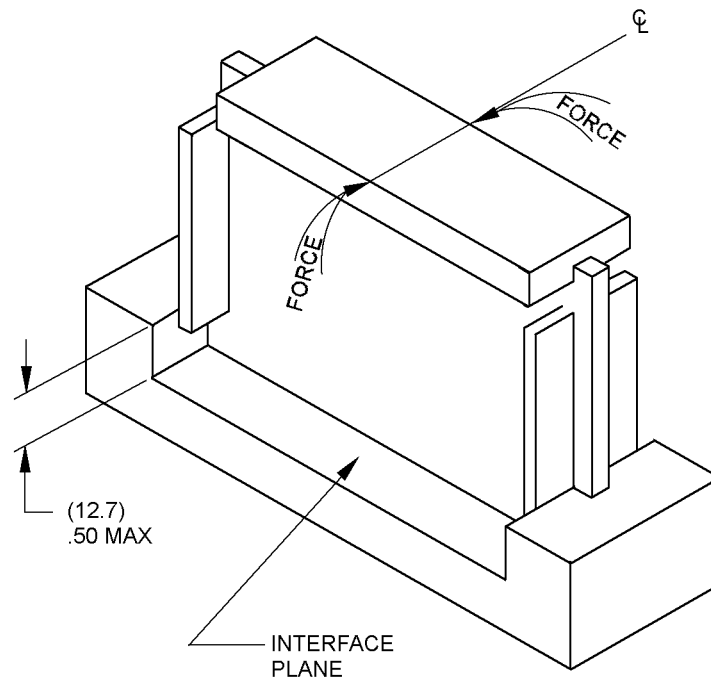
NOTES:

1. Metric equivalents are in parenthesis and given for general information only.
2. "A" is 1.0 inch (25.4 mm) for formats C, D and E.

FIGURE 8. Fin or header torque (formats C, D, and E).

MIL-DTL-28754E

Formats A, B 2.0 lb (9.0 newtons)
Formats C, D, E 5.0 lb (22.3 newtons)
Minimum in both directions

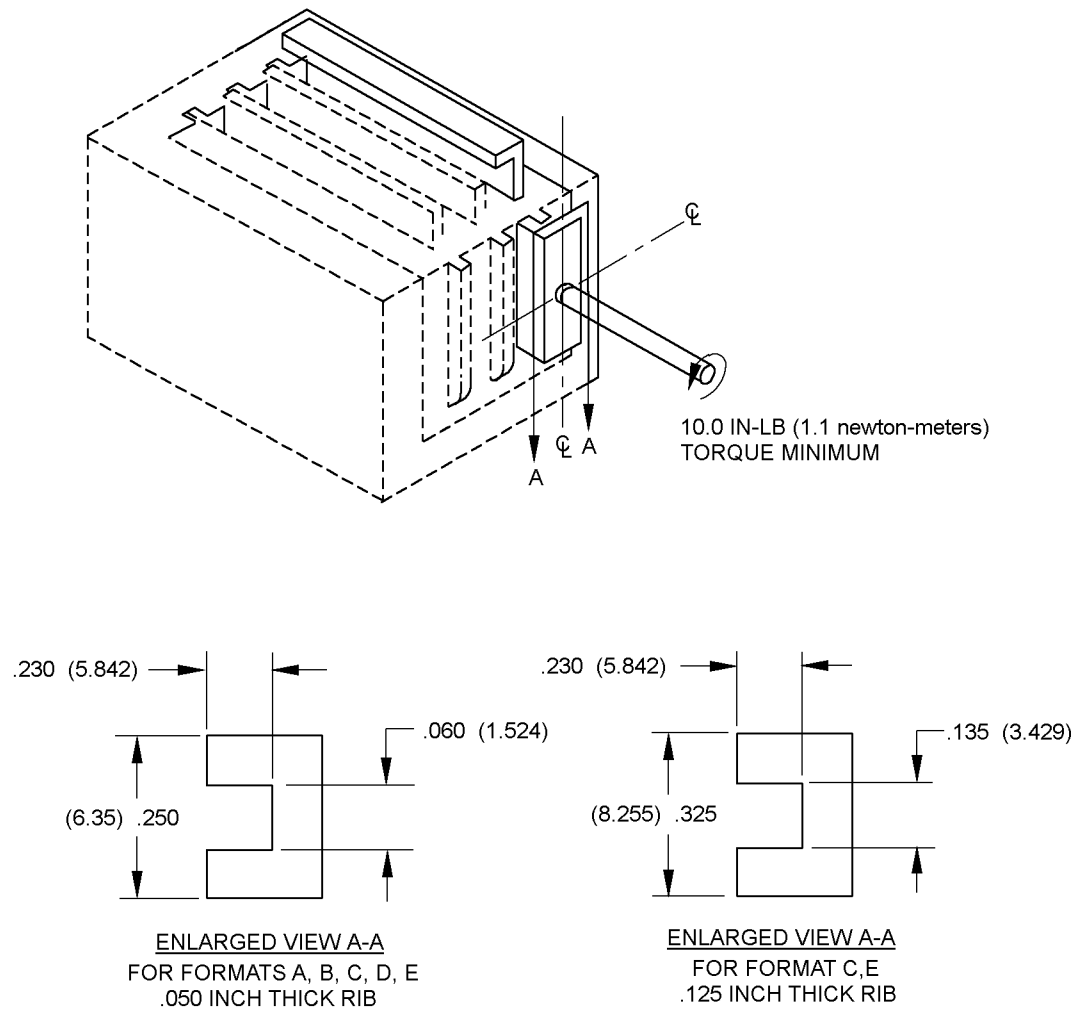


NOTES:

1. Dimensions are in inches.
2. Metric equivalents are in parentheses and given for general information only.

FIGURE 9. Fin or header cantilever load.

MIL-DTL-28754E



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are in parentheses and given for general information only.
3. Unless otherwise specified, tolerances are plus 0.005, minus 0.000 inch (plus 0.127, minus 0.000 mm).
4. Length of slot for enlarged view A-A must be equal or longer than the frame guide rib length.

FIGURE 10. Rib torque test.

MIL-DTL-28754E

APPENDIX

PROCEDURE FOR FIRST ARTICLE INSPECTION

10. SCOPE

10.1 Scope. This appendix details the procedure of samples, with related data, for first article inspection of connectors, contacts, and associated backplanes covered by this specification. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS

20.1 Government documents.

20.1.1 Specifications. The following specifications form a part of this appendix to the extent specified herein. Unless otherwise specified the issues of these documents are those listed in the issue of the Acquisition Streamlining and Standardization Information System (ASSIST) database and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

MILITARY

MIL-DTL-16878	-	Wire, Electrical, Insulated, General Specification For.
MIL-DTL-28754/6	-	Connectors, Electrical, Modular, Type IV, 40 Pin, Straight Through
MIL-DTL-28754/21-	-	Connectors, Electrical, Modular, Frame, Casting, Type IV, Double Span.
MIL-DTL-28754/31-	-	Connectors, Electrical, Modular, Connector Assembly, Type V, 40 Pin, Two Piece Insert, and 20 Pin, One-Half, One Piece Insert.
MIL-DTL-28754/34-	-	Connectors, Electrical, Modular, Connector Type III, Female Contact and Insulator Bushing Set, Removable Wire Wrappost Terminal.
MIL-DTL-28754/35-	-	Connector, Electrical, Modular, Connector Type III, Male Contact and Insulator Bushing Set, Removable Wire Wrappost Terminal.
MIL-DTL-28754/36-	-	Connector, Electrical, Modular, Connector, Type III, Female Contact and Grounding Bushing Set, Removable Wire Wrappost Terminal.
MIL-DTL-28754/37-	-	Connector, Electrical, Modular, Connector, Type III, Female Contact and Polarizing Bushing Set, Removable Wire Wrappost Terminal.
MIL-DTL-28754/38-	-	Connector, Electrical, Modular, Connector, Type III, Wrappost Contact and Grounding Bushing Set, Removable Wire Wrappost Terminal.
MIL-DTL-28754/39-	-	Connector, Electrical, Modular, Connector, Type III, Keing Pegs.
MIL-C-28754/67-	-	Connectors, Electrical, Modular, Type III, Female Contact and Insulator Bushing Set, Low Insertion Force (LIF), Removable Wire Wrappost Terminal.
MIL-C-28754/79	-	Connectors, Electrical, Modular, Type III, Female Contact and Insulator Bushing Set, Low Insertion Force (LIF), Removable Wire Wrappost Terminal.
MIL-C-28754/80	-	Connectors, Electrical, Modular, Type III, Female Contact and Grounding Bushing Set, Low Insertion Force (LIF), Removable Wire Wrappost Terminal.
MIL-C-28754/81	-	Connectors, Electrical, Modular, Type III, Female Contact and Polarizing Bushing Set, Low Insertion Force (LIF), Removable Wire Wrappost Terminal.
MIL-DTL-49055	-	Cable, Power, Electrical, (Flexible, Flat, Unshielded), (Round Conductor), General Specification For.

(Copies of these documents are available online at <http://quicksearch.dla.mil>)

MIL-DTL-28754E

APPENDIX

30.2 Type III sample. The backplane illustrated on [figure 11](#) shall be used as the conveyance for testing the type III connector components, and the construction of the backplane, on [figure 11](#), shall form a part of the first article requirements. Connector components manufactured in accordance with this specification, for which first article inspection is desired, shall be installed on [figure 11](#) backplane in the locations described, and the wrappost length shall be 0.500 inch (12.700 mm). Ten of each other length connector contact wrappost to be qualified shall be submitted as loose parts (see [30.4.1](#)). The loose parts shall be subjected to visual and mechanical examination but first article inspection is contingent upon the successful first article inspection of the same specification sheet parts installed on [figure 11](#) backplane

30.2.1 One-layer type III sample (6 ounce maximum insertion force tuning fork). The [figure 11](#) backplane shall be used to test sample of 6.0 ounce (1.6 newtons) maximum insertion force tuning fork connector contacts.

- (a) MIL-DTL-28754/34 - The MIL-DTL-28754/34 samples will always be accompanied by MIL-DTL-28754/37 samples (see [table VII](#) and [figure 11](#)).
- (b) MIL-DTL-28754/35 – See [table VIII](#) and [figure 11](#).
- (c) MIL-DTL-28754/36 – See [table IX](#) and [figure 11](#).
- (d) MIL-DTL-28754/38 – See [table X](#) and [figure 11](#).

TABLE VII. MIL-DTL-28754/34 sample backplane population.

Specification sheet(s) first article inspection	Row or position	Contains
/34 and /37	Keying position of all rows remaining position	/37 style "s" /34
/34 and /37	A, C, E, G	/34, /37
/35 or /36 or /38	B, D, F	/35 or /36 or /38
/34 and /37	C, D, E, F, G	/34, /37
/35 and /36	A1, B1 A2, B2	/35 /36
/34 and /37	remaining	/34, /37
/35 and /38	A1, B1 A2, B2	/35 /38
/34 and /37	remaining	/34, /37
/36 and /38	A1, B1 A2, B2	/38 /36
/34, /35, /36, /37, /38	C, D, E, F, G and their keying positions A1 A2, B2 B1	/34 /37 "s" /35 /36 /38

MIL-DTL-28754E

APPENDIX

TABLE VIII. MIL-DTL-28754/35 sample backplane population.

Specification sheet(s) first article inspection	Row or position	Contains
/35	all	/35
/35 and /38	A, C, E, G B, D, F	/35 /38
/35, /34, /36, /37, /38	See table VII, last case	

30.2.2 One-layer type III sample (2.25 ounce maximum insertion force tuning fork). The [figure 11](#) backplane shall be used to test sample of 2.25 ounce (0.63 newton) insertion force tuning fork contacts. If both standard and LIF components are to be first article inspection, separate test coupons shall be used.

- (a) MIL-DTL-28754/79 – The MIL-DTL-28754/79 samples will always be accompanied by MIL-DTL-28754/81 samples (see tables VIII and figure 11, replace /34 with /79 and /37 with /81.
- (b) MIL-DTL-28754/80 – See [table IX](#) and [figure 11](#), replacing /36 with /80.
- (c) MIL-DTL-28754/35 and /38. If these were not submitted with 6 oz. contacts (see 30.2.1), they may be submitted on the LIF coupon. See tables IX and XI and [figure 11](#).

TABLE IX. MIL-DTL-28754/36 sample backplane population.

Specification sheet(s) first article inspection	Row or position	Contains
/36	all	/36
/36 and /37	A, B, C, D, E, F, G keying positions of all rows	/36 /37 style “s”
/36 and /38	B, D, F A, C, E, G	/38 /36
/36, /34, /35, /37, /38	See table VII , last case	

TABLE X. MIL-DTL-28754/38 sample backplane population.

Specification sheet(s) first article inspection	Row or position	Contains
/38	all	/38
/38 and /35	See table VIII , case 2	
/38 and /36	See table IX , case 3	
/38, /34, /37	See table VII , case 2	
/38, /34, /35, /36, /37	See table VII , last case	

30.3 Type IV and V sample. Twelve connectors of types IV and V having the same number of contacts of the same size for which first article inspection is desired shall be subjected to first article inspection. The twelve connectors submitted in the sample shall be divided equally between the various termination sizes for which first article inspection is desired. Fifty percent of each of the various termination sizes

MIL-DTL-28754E

APPENDIX

shall be wired to the smallest size wire and 50 percent of each of the various termination sizes shall be wired to the largest size conductor for which it is designed (see [table XI](#)).

30.3.1 Preparation of sample (type V). The sample, which must be wired to complete the test, shall be wired as follows:

- (a) Crimp-solder-type contacts shall have the appropriate stranded wire terminated to the contact sizes indicated.
 - (1) Sizes 16 through 32 – Stranded tinned copper wire, minimum of 7 strands, in accordance with MIL-DTL-16878.
- (b) Solder-type contacts shall have the appropriate stranded wire or flat cable terminated to the contact sizes indicated.
 - (1) Sizes 24 through 30 – Flat cable assembly, 20-conductor, in accordance with MIL-DTL-49055.
 - (2) Sizes 20 through 30 – Stranded copper wire, in accordance with SAE AS81044 and MIL-DTL-16878.

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection. 1/

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
6-01	Subgroup IV	N/A	N/A	12
6-02	Connector fin	N/A	N/A	12
6-03	Torque, fin	N/A	N/A	12
6-04	Cantilever load, guide rib strength.	N/A	N/A	12
7-02	N/A	X	N/A	12
7-03	N/A	X	N/A	12
7-04	N/A	X	N/A	12
7-05	N/A	X	N/A	12
8-01	Subgroup II Pin shield retention. Subgroup IV Pin shield retention, connector fin torque, fin cantilever load, guide rib strength	N/A	N/A	12
9-01	N/A	X	N/A	12
9-02	N/A	X	N/A	12
9-03	N/A	X	N/A	12
10-01	Subgroup IV	N/A	N/A	12
10-02	Connector fin	N/A	N/A	12
10-03	Torque, fin	N/A	N/A	12
10-04	Cantilever load, guide rib strength	N/A	N/A	12
11-01	Subgroup IV	N/A	N/A	12
11-02	Connector fin torque, fin cantilever load, guide rib strength.	N/A	N/A	12
12-01	N/A	X	N/A	12
12-02	N/A	X	N/A	12
12-03	N/A	X	N/A	12
12-04	N/A	X	N/A	12
12-05	N/A	X	N/A	12
13-01	Subgroup IV	N/A	N/A	12
13-02	Guide rib strength	N/A	N/A	12
14-01	Same as /8	N/A	N/A	12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection.- Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
15-01	N/A	N/A	Subgroup I	20
15-02	N/A	N/A	Crimp or solder joint resistance. Subgroup V testing.	20
16-01	N/A	N/A	Subgroup I	12
16-02	N/A	N/A	Visual and mechanical examination.	12
17-01	N/A	X	N/A	12
17-02	N/A	X	N/A	12
17-03	N/A	X	N/A	12
17-04	N/A	X	N/A	12
18-01	N/A	N/A	Subgroup I	12
18-02	N/A	N/A	Visual and mechanical examination.	12
18-03	N/A	N/A		12
19-01	N/A	N/A	Subgroup I	12
19-02	N/A	N/A	Visual and mechanical examination.	12
19-03	N/A	N/A		12
20-01	N/A	N/A	Subgroup I	12
20-02	N/A	N/A	Visual and mechanical examination.	12
20-03	N/A	N/A		12
21-01	N/A	N/A	Subgroup I	12
21-02	N/A	N/A	Visual and mechanical examination.	12
21-03	N/A	N/A	Subgroup II Vibration, pin shield retention, visual and mechanical examination. Subgroup III Salt spray visual and mechanical examination. Subgroup IV Shock pin shield retention. Connector fin torque, fin cantilever load, guide rib strength, and visual and mechanical examination.	12
22-01	N/A	N/A		12
22-02	N/A	N/A		12
22-03	N/A	N/A		12
23-01	N/A	N/A		12
23-02	N/A	N/A		12
23-03	N/A	N/A		12
24-01	N/A	N/A	Subgroup I	12
24-02	N/A	N/A	Visual and mechanical examination	12
24-03	N/A	N/A		12
24-04	N/A	N/A		12
24-05	N/A	N/A		12
24-06	N/A	N/A		12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection.- Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
31-01	Subgroup II Vibration and these tests that follow vibration. Contact retention, contact resistance, pin shield retention. Subgroup IV Shock, pin shield retention, connector fin torque, guide rib strength, contact retention	N/A	N/A	6
31-02		N/A	N/A	N/A
31-03		N/A	N/A	N/A
31-04		N/A	N/A	N/A
31-05		N/A	N/A	N/A
31-06		N/A	N/A	6
31-07		N/A	N/A	N/A
31-08		N/A	N/A	N/A
31-09		N/A	N/A	N/A
32-01	N/A	X	N/A	N/A
32-02	N/A	X	N/A	N/A
32-11	N/A	X	N/A	N/A
32-12	N/A	X	N/A	N/A
32-14	N/A	X	N/A	N/A
32-15	N/A	X	N/A	N/A
32-20	N/A	X	N/A	N/A
32-21	N/A	X	N/A	12
32-22	N/A	X	N/A	N/A
32-23	N/A	X	N/A	N/A
33-01	N/A	X	N/A	N/A
33-07	N/A	X	N/A	6
33-08	N/A	X	N/A	N/A
33-09	N/A	X	N/A	N/A
33-10	N/A	X	N/A	N/A
33-11	N/A	X	N/A	N/A
33-12	N/A	X	N/A	6
33-13	N/A	X	N/A	N/A
33-14	N/A	X	N/A	N/A
33-15	N/A	X	N/A	N/A

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection.- Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
40-01	N/A	N/A	Subgroup I	12
40-02	N/A	N/A	Visual and mechanical	12
40-03	N/A	N/A	examination.	12
41-01	N/A	N/A	Subgroup I	12
41-02	N/A	N/A	Visual and mechanical	12
41-03	N/A	N/A	examination.	12
41-04	N/A	N/A		12
44-01	See	N/A	N/A	12
44-02	MIL-DTL-28754/6	N/A	N/A	12
45-01	N/A	N/A	See	12
			MIL-DTL-28754/21	
46-01	N/A	X	N/A	12
47-01	See	N/A	N/A	12
	MIL-DTL-28754/6			
49-01	N/A	N/A	See	12
49-02	N/A	N/A	MIL-DTL-28754/21	12
49-03	N/A	N/A		12
50-01	See	N/A	N/A	12
50-02	MIL-DTL-28754/31	N/A	N/A	12
50-03		N/A	N/A	12
50-04		N/A	N/A	12
51-01	See	N/A	N/A	12
51-02	MIL-DTL-28754/31	N/A	N/A	12
51-03		N/A	N/A	12
51-04		N/A	N/A	12
54-01	N/A	N/A	Subgroup I Visual and	4
54-02	N/A	N/A	mechanical examination and	4
			tests called out on	
			specification sheet.	
55-01	N/A	X	N/A	6
55-02	N/A	X	N/A	6
56-01	See	N/A	N/A	12
56-02	MIL-DTL-28754/6	N/A	N/A	12
56-03		N/A	N/A	12
56-04		N/A	N/A	12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection.- Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
57-01	See MIL-DTL-28754/6	N/A	N/A	12
57-02		N/A	N/A	12
57-03		N/A	N/A	12
57-04		N/A	N/A	12
58-01	See MIL-DTL-28754/6	N/A	N/A	12
58-02		N/A	N/A	12
59-01	See MIL-DTL-28754/6	N/A	N/A	12
59-02		N/A	N/A	12
59-03		N/A	N/A	12
59-04		N/A	N/A	12
59-05		N/A	N/A	12
59-06		N/A	N/A	12
59-07		N/A	N/A	12
59-08		N/A	N/A	12
59-09		N/A	N/A	12
59-10		N/A	N/A	12
59-11		N/A	N/A	12
59-12		N/A	N/A	12
60-01	See MIL-DTL-28754/6	N/A	N/A	12
60-02		N/A	N/A	12
60-03		N/A	N/A	12
60-04		N/A	N/A	12
60-05		N/A	N/A	12
60-06		N/A	N/A	12
61-01	See MIL-DTL-28754/6	N/A	N/A	12
61-02		N/A	N/A	12
61-03		N/A	N/A	12
61-04		N/A	N/A	12
61-05		N/A	N/A	12
61-06		N/A	N/A	12
61-07		N/A	N/A	12
61-08		N/A	N/A	12
61-09		N/A	N/A	12
61-10		N/A	N/A	12
61-11		N/A	N/A	12
61-12		N/A	N/A	12
62-01	See MIL-DTL-28754/6	N/A	N/A	12
62-02		N/A	N/A	12
62-03		N/A	N/A	12
63-01	See MIL-DTL-28754/6	N/A	N/A	12
63-02		N/A	N/A	12
63-03		N/A	N/A	12
63-04		N/A	N/A	12
64-01	See MIL-DTL-28754/6	N/A	N/A	12
64-02		N/A	N/A	12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection.- Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
64-03	See	N/A	N/A	12
64-04	MIL-DTL-28754/6	N/A	N/A	12
65-01	See	N/A	N/A	12
65-02	MIL-DTL-28754/6	N/A	N/A	12
65-03		N/A	N/A	12
65-04		N/A	N/A	12
65-05		N/A	N/A	12
65-06		N/A	N/A	12
65-07		N/A	N/A	12
65-08		N/A	N/A	12
65-09		N/A	N/A	12
65-10		N/A	N/A	12
65-11		N/A	N/A	12
65-12		N/A	N/A	12
66-01	See	N/A	N/A	12
66-02	MIL-DTL-28754/6	N/A	N/A	12
66-03		N/A	N/A	12
66-04		N/A	N/A	12
66-05		N/A	N/A	12
66-06		N/A	N/A	12
66-07		N/A	N/A	12
66-08		N/A	N/A	12
66-09		N/A	N/A	12
66-10		N/A	N/A	12
66-11		N/A	N/A	12
66-12		N/A	N/A	12
67-01	N/A	N/A	Subgroup I	12
67-02	N/A	N/A	Visual and mechanical.	12
67-03	N/A	N/A	Subgroup II vibration and tests that follow. Visual/mechanical Subgroup III salt spray and following tests. Visual/mechanical Subgroup IV shock, following tests, fin torque, fin cantilever load guide rib strength.	12
68-01	N/A	N/A	See	12
68-02	N/A	N/A	MIL-DTL-28754/67	12
68-03	N/A	N/A		12
68-04	N/A	N/A		12
68-05	N/A	N/A		12
68-06	N/A	N/A		12
68-07	N/A	N/A		12
68-08	N/A	N/A		12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection - Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
68-09	N/A	N/A	See	12
68-10	N/A	N/A	MIL-DTL-28754/67	12
69-01	N/A	N/A	See	12
69-02	N/A	N/A	MIL-DTL-28754/67	12
69-03	N/A	N/A		12
69-04	N/A	N/A		12
69-05	N/A	N/A		12
69-06	N/A	N/A		12
70-01	N/A	N/A	See	12
70-02	N/A	N/A	MIL-DTL-28754/67	12
70-03	N/A	N/A		12
71-01	N/A	N/A	See	12
71-02	N/A	N/A	MIL-DTL-28754/67	12
71-03	N/A	N/A		12
71-04	N/A	N/A		12
71-05	N/A	N/A		12
71-06	N/A	N/A		12
72-01	N/A	N/A	See	12
72-02	N/A	N/A	MIL-DTL-28754/67	12
72-03	N/A	N/A		12
72-04	N/A	N/A		12
72-05	N/A	N/A		12
72-06	N/A	N/A		12
72-07	N/A	N/A		12
72-08	N/A	N/A		12
72-09	N/A	N/A		12
72-10	N/A	N/A		12
73-01	N/A	X	N/A	12
73-02	N/A	X	N/A	12
73-03	N/A	X	N/A	12
73-04	N/A	X	N/A	12
73-05	N/A	X	N/A	12
73-06	N/A	X	N/A	12
73-07	N/A	X	N/A	12
73-08	N/A	X	N/A	12
73-09	N/A	X	N/A	12
73-10	N/A	X	N/A	12
73-11	N/A	X	N/A	12
73-12	N/A	X	N/A	12
73-13	N/A	X	N/A	12
73-14	N/A	X	N/A	12
73-15	N/A	X	N/A	12
73-16	N/A	X	N/A	12
73-17	N/A	X	N/A	12
73-18	N/A	X	N/A	12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection. - Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
73-19	N/A	X	N/A	12
73-20	N/A	X	N/A	12
73-21	N/A	X	N/A	12
73-22	N/A	X	N/A	12
73-23	N/A	X	N/A	12
73-24	N/A	X	N/A	12
73-25	N/A	X	N/A	12
73-26	N/A	X	N/A	12
73-27	N/A	X	N/A	12
73-28	N/A	X	N/A	12
73-29	N/A	X	N/A	12
73-30	N/A	X	N/A	12
74-01	N/A	X	N/A	12
74-02	N/A	X	N/A	12
74-03	N/A	X	N/A	12
74-04	N/A	X	N/A	12
74-05	N/A	X	N/A	12
74-06	N/A	X	N/A	12
74-07	N/A	X	N/A	12
74-08	N/A	X	N/A	12
74-09	N/A	X	N/A	12
74-10	N/A	X	N/A	12
74-11	N/A	X	N/A	12
74-12	N/A	X	N/A	12
74-13	N/A	X	N/A	12
74-14	N/A	X	N/A	12
74-15	N/A	X	N/A	12
74-16	N/A	X	N/A	12
74-17	N/A	X	N/A	12
74-18	N/A	X	N/A	12
74-19	N/A	X	N/A	12
74-20	N/A	X	N/A	12
74-21	N/A	X	N/A	12
74-22	N/A	X	N/A	12
74-23	N/A	X	N/A	12
74-24	N/A	X	N/A	12
74-25	N/A	X	N/A	12
74-26	N/A	X	N/A	12
74-27	N/A	X	N/A	12
74-28	N/A	X	N/A	12
74-29	N/A	X	N/A	12
74-30	N/A	X	N/A	12
74-31	N/A	X	N/A	12
74-32	N/A	X	N/A	12
74-33	N/A	X	N/A	12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection.- Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
74-34	N/A	X	N/A	12
74-35	N/A	X	N/A	12
74-36	N/A	X	N/A	12
74-37	N/A	X	N/A	4
74-38	N/A	X	N/A	4
74-39	N/A	X	N/A	4
74-40	N/A	X	N/A	4
74-41	N/A	X	N/A	4
74-42	N/A	X	N/A	4
74-43	N/A	X	N/A	4
74-44	N/A	X	N/A	4
74-45	N/A	X	N/A	4
74-46	N/A	X	N/A	4
74-47	N/A	X	N/A	4
74-48	N/A	X	N/A	4
74-49	N/A	X	N/A	4
74-50	N/A	X	N/A	4
74-51	N/A	X	N/A	4
74-52	N/A	X	N/A	4
74-53	N/A	X	N/A	4
74-54	N/A	X	N/A	4
75-01	N/A	X	N/A	12
75-02	N/A	X	N/A	12
75-03	N/A	X	N/A	12
75-04	N/A	X	N/A	12
75-05	N/A	X	N/A	12
75-06	N/A	X	N/A	12
75-07	N/A	X	N/A	12
75-08	N/A	X	N/A	12
75-09	N/A	X	N/A	12
75-10	N/A	X	N/A	12
75-11	N/A	X	N/A	12
75-12	N/A	X	N/A	12
75-13	N/A	X	N/A	12
75-14	N/A	X	N/A	12
75-15	N/A	X	N/A	12
75-16	N/A	X	N/A	12
75-17	N/A	X	N/A	12
75-18	N/A	X	N/A	12
75-19	N/A	X	N/A	12
75-20	N/A	X	N/A	12
75-21	N/A	X	N/A	12
75-22	N/A	X	N/A	12
75-23	N/A	X	N/A	12
75-24	N/A	X	N/A	12

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection.- Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
75-25	N/A	X	N/A	12
75-26	N/A	X	N/A	12
75-27	N/A	X	N/A	12
75-28	N/A	X	N/A	12
75-29	N/A	X	N/A	12
75-30	N/A	X	N/A	12
75-31	N/A	X	N/A	12
75-32	N/A	X	N/A	12
75-33	N/A	X	N/A	12
75-34	N/A	X	N/A	12
75-35	N/A	X	N/A	12
75-36	N/A	X	N/A	12
76-01	N/A	X	N/A	12
76-02	N/A	X	N/A	12
76-03	N/A	X	N/A	12
76-04	N/A	X	N/A	12
76-05	N/A	X	N/A	12
76-06	N/A	X	N/A	12
76-07	N/A	X	N/A	12
76-08	N/A	X	N/A	12
76-09	N/A	X	N/A	12
76-10	N/A	X	N/A	12
76-11	N/A	X	N/A	12
76-12	N/A	X	N/A	12
76-13	N/A	X	N/A	12
76-14	N/A	X	N/A	12
76-15	N/A	X	N/A	12
76-16	N/A	X	N/A	12
76-17	N/A	X	N/A	12
76-18	N/A	X	N/A	12
76-19	N/A	X	N/A	12
76-20	N/A	X	N/A	12
76-21	N/A	X	N/A	12
76-22	N/A	X	N/A	12
76-23	N/A	X	N/A	12
76-24	N/A	X	N/A	12
76-25	N/A	X	N/A	12
76-26	N/A	X	N/A	12
76-27	N/A	X	N/A	4
76-28	N/A	X	N/A	4
76-29	N/A	X	N/A	4
76-30	N/A	X	N/A	4

MIL-DTL-28754E

APPENDIX

TABLE XI. Sample first article inspection. - Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
76-31	NA	X	NA	4
76-32	N/A	X	N/A	4
76-33	N/A	X	N/A	4
76-34	N/A	X	N/A	4
76-35	N/A	X	N/A	4
76-36	N/A	X	N/A	4
76-37	N/A	X	N/A	4
76-38	N/A	X	N/A	4
76-39	N/A	X	N/A	4
77-01	N/A	X	N/A	12
77-02	N/A	X	N/A	12
77-03	N/A	X	N/A	12
77-04	N/A	X	N/A	12
77-05	N/A	X	N/A	12
77-06	N/A	X	N/A	12
77-07	N/A	X	N/A	12
77-08	N/A	X	N/A	12
77-09	N/A	X	N/A	12
77-10	N/A	X	N/A	12
77-11	N/A	X	N/A	12
77-12	N/A	X	N/A	12
77-13	N/A	X	N/A	12
77-14	N/A	X	N/A	12
77-15	N/A	X	N/A	12
77-16	N/A	X	N/A	12
77-17	N/A	X	N/A	12
77-18	N/A	X	N/A	12
77-19	N/A	X	N/A	12
77-20	N/A	X	N/A	12
77-21	N/A	X	N/A	12
77-22	N/A	X	N/A	12
77-23	N/A	X	N/A	12
77-24	N/A	X	N/A	12
77-25	N/A	X	N/A	12
77-26	N/A	X	N/A	12
77-27	N/A	X	N/A	12
78-01	N/A	X	N/A	12
78-02	N/A	X	N/A	12
78-03	N/A	X	N/A	12
78-04	N/A	X	N/A	12

MIL-DTL-28754E

APPENDIX

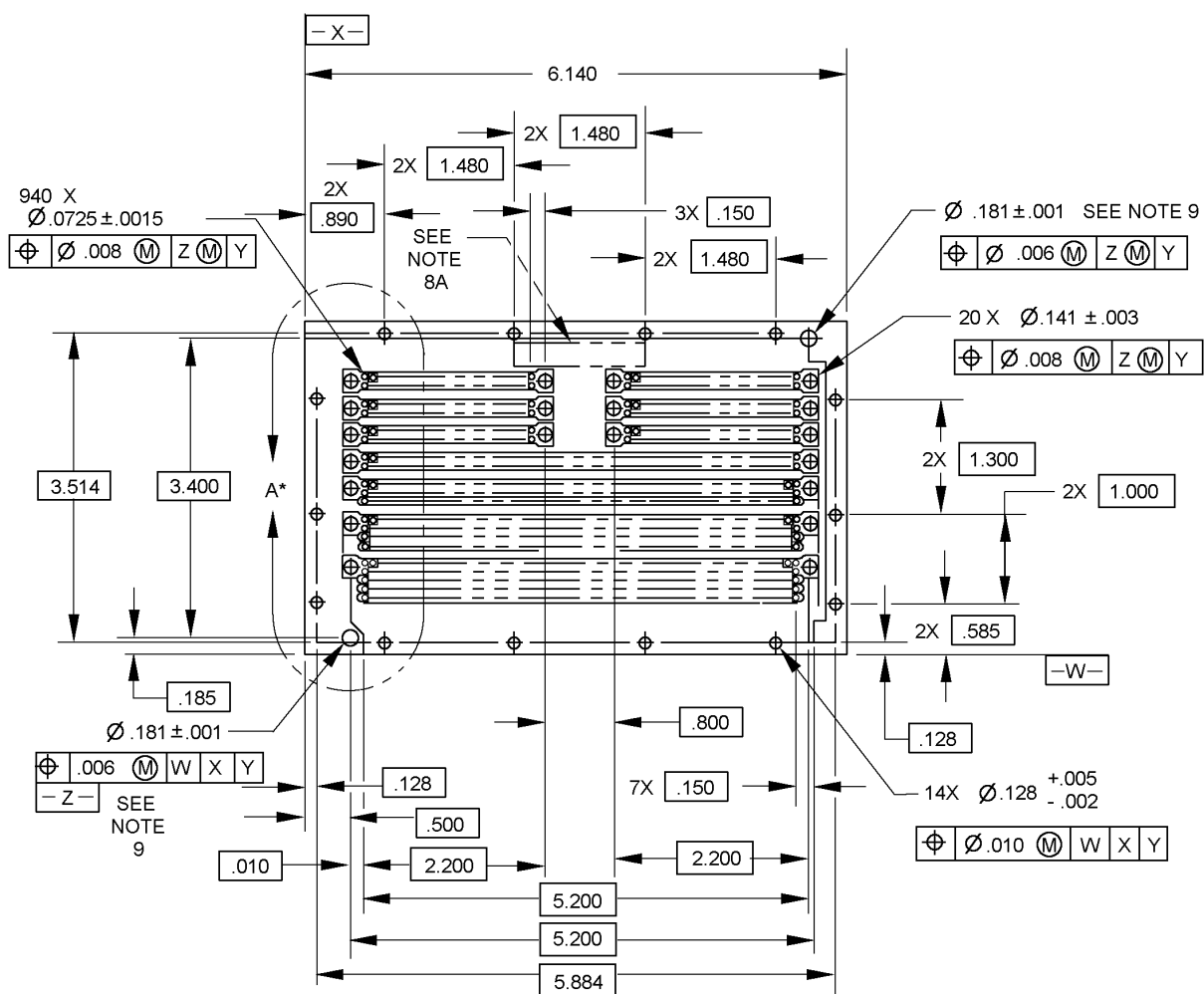
TABLE XI. Sample first article inspection. - Continued

Military part number M28754/	Perform all tests except	Perform all tests	Delete all tests except	Sample quantity
78-05	N/A	X	N/A	12
78-06	N/A	X	N/A	12
78-07	N/A	X	N/A	12
78-08	N/A	X	N/A	12
78-09	N/A	X	N/A	12
78-10	N/A	X	N/A	12

1/ N/A = Not applicable. X = Affirmative.

MIL-DTL-28754E

APPENDIX

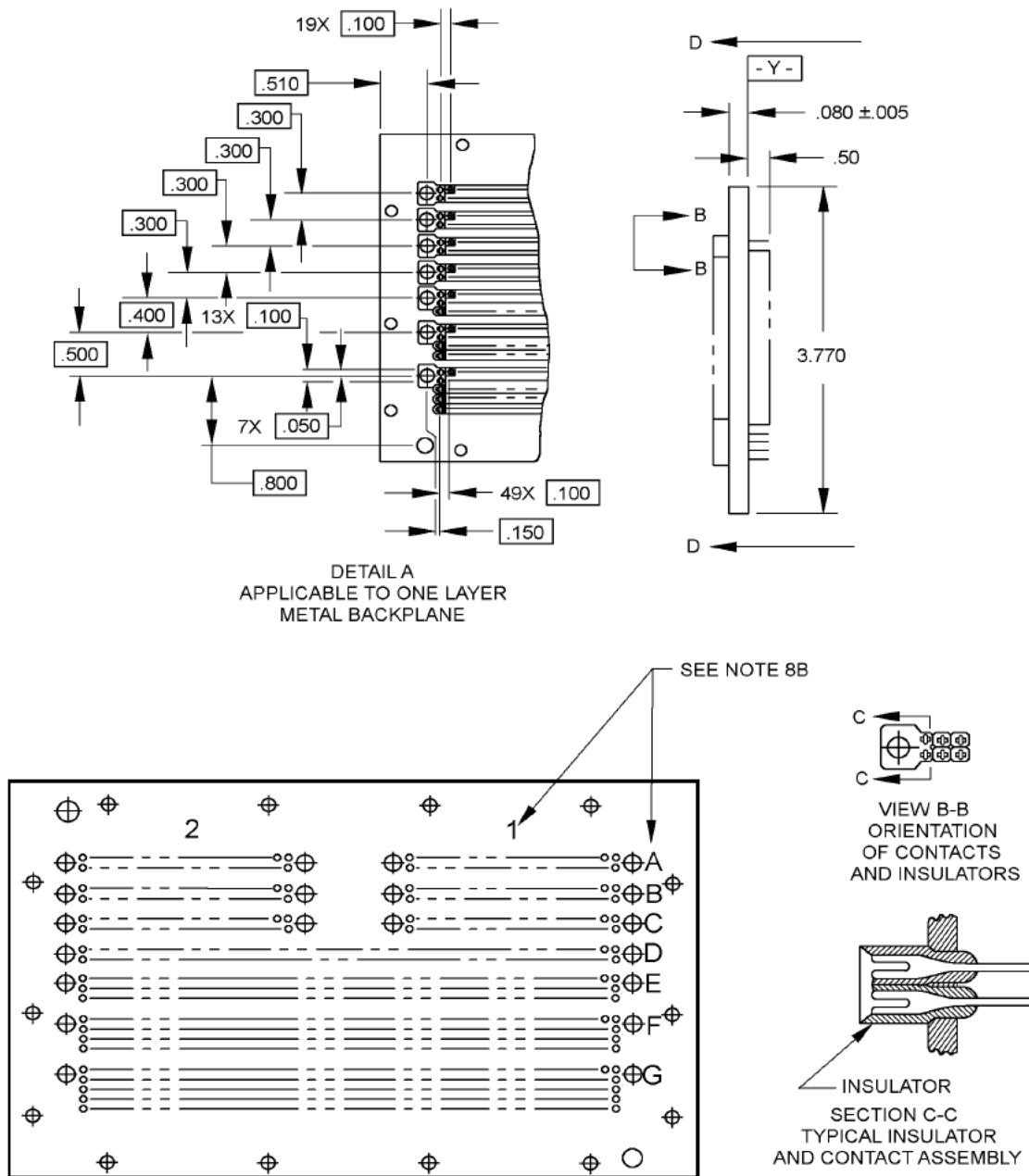


SEE APPLICABLE DETAIL FOR ONE LAYER OR TWO LAYER METAL BACKPLANE

FIGURE 11. Component first article inspection backplane.

MIL-DTL-28754E

APPENDIX

FIGURE 11. Component first article inspection backplane – Continued.

MIL-DTL-28754E

APPENDIX

INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM
0.001	0.03	0.0725	1.842	0.400	10.16	2.200	55.88
0.0015	0.0383	0.080	2.03	0.500	12.70	3.400	86.36
0.002	0.053	0.100	2.54	0.510	12.95	3.514	89.26
0.003	0.08	0.128	3.25	0.585	14.86	3.770	95.76
0.005	0.13	0.141	3.58	0.800	20.32	5.200	132.08
0.006	0.15	0.150	3.81	0.890	22.61	5.884	149.45
0.008	0.20	0.181	4.60	1.000	25.40	6.140	155.96
0.010	0.25	0.185	4.70	1.300	33.02		
0.050	1.27	0.300	7.62	1.480	37.59		

NOTES:

- Dimensions are in inches.
- Metric equivalents are given for general information only.
- Unless otherwise specified, tolerance is plus or minus 0.005 inch (0.13 mm) for three place decimals, plus or minus 0.01 inch (0.3 mm) for two place decimals, and plus or minus 2 degrees for angles.
- Unless otherwise specified, all corner radii shall be 0.002 inch (0.51 mm) radius maximum.
- Finish: anodize, MIL-A-8625, type II, class 1, non-dyed or chemical film per MIL-DTL-5541, class 3.
- All holes shall meet the dimensional requirements specified on the drawing for a minimum of 50 percent of the plate thickness.
- Plate shall be flat within 0.003 per inch.
- Plate shall be marked as per drawing using A-A-56032, contrasting color ink.
 - The part number and the manufacturer's code identification is in an area outlined by phantom lines using 0.12 plus or minus 0.02 inch (3.0 plus or minus 0.5 mm) high Gothic or Futura characters.
 - Mark letters and numbers in 0.09 plus or minus 0.02 inch (2.3 plus or minus 0.5 mm) high Gothic characters.
- The 0.181 diameter holes are tooling holes and shall be used to locate the plate in the wire wrapping machine.
- Assembly of contacts, insulators and bushings shall meet the requirements stated herein and in the specification sheet.

FIGURE 11. Component first article inspection backplane – Continued.

MIL-DTL-28754E

CONCLUDING MATERIAL

Custodians:

Army - CR
Navy - AS
Air Force - 85
DLA - CC

Preparing activity:

DLA - CC

(Project 5935-2016-029)

Review activities:

Army - AR, MI
Navy - MC
Air Force - 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.