1.0 GENERAL

1.1 SCOPE

This specification covers the Bergstik®and Bergstrip™ Headers, designed for use in low-power applications requiring a printed wiring -board mounted straight or right angle disconnect. The header provides only the pin half of the interconnection, using any 0.025" square pin mateable receptacle to complete the connection. This product is Lead Free and meets the requirement of the European Union Directive of Restrictions for Hazardous Substances (Directive 2002/95/EC). The specification is composed of the following sections:

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2.0 APPLICABLE DOCUMENTS

The following documents, of the issue in effect on the date of the latest revision of this specification, shall form a part of this specification to the extent specified herein.

Military Specifications

MIL-F-14256	Flux, Soldering, Liquid (Rosin Base), Activated
MIL-G-45204	Gold Plating, Electrodeposited
MIL-P-45209	Palladium Plating, Electrodeposited
MIL-P-55110	Printer Wiring Boards
MIL-P81728	Plating, Tin-Leaded (Electrodeposited)

Federal Specifications

QQ-N-290	Nickel Plating (Electrodeposited)
QQ-W-343	Wire, Electrical and Nonelectrical, Copper (Uninsulated)
QQ-S-571	Solder: Lead Alloy, Tin-Lead Allow, and Tin Alloy, Flux Cored Ribbon and Wire, and Solid Form

Military Standards

MIL-STD-105	Sampling Procedures & Tables for Inspection by Attributes
MIL-STD-202	Test Methods for Electrical and Electronic Component Parts
MIL-STD-275	Printed Wiring for Electronic Equipment
MIL-STD-1344	Test Methods for Electrical Connectors
ISO-9000	Calibration System Requirements

Industry Specifications/Standards

UL-94	Tests for Flammability of Plastic Materials
ASTM B-159	Phosphor Bronze Wire
ASTM D-2897	Reinforced & Filled Nylon Injection Molding & Extrusion Materials

FCI Labs Reports- Supporting Data

ZA5-2625	Lead Free Plating Investigation

3.0 REQUIREMENTS

3.1 Qualification

Headers furnished under this specification shall be products capable of meeting or exceeding the qualification test requirements specified herein.

3.2 Material

The material for each part shall be specified herein, or equivalent. Substitute material shall meet or exceed the performance requirements of this specification.

3.2.1 Contact. The contact shall be Phosphor Bronze Alloy UNS C51000 in accordance with ASTM B-159 or other copper alloy as specified on the product drawing.

3.2.2 Insulator. The insulator shall be glass- or mineral-filled nylon in accordance with ASTM D-2897, polyphenylene sulfide (PPS) ,PCT or LCP. All plastic material shall be rated V-0 in accordance with UL-94.

3.3 Finish

The finish of the contact shall be specified herein for the particular type of header under consideration.

3.3.1 Solder tails. As defined by product drawings, will be plated with the specified thickness of pure tin for Lead Free. Or 93/7 tin-lead per MIL-P-81728 option. Or gold per MIL-G-45204 Type II, Grade C option. Or palladium alloy per MIL-P-45209 option.
Tin plated “LF” product has 100% tin plating in the interface and has not been tested for whisker growth in all interconnect environments

3.3.2 Contact Area. As defined by product drawings, will be plated with the specified thickness of pure tin for Lead Free. Or 93/7 tin-lead per MIL-P-81728 option. Or gold per MIL-G-45204 Type II, Grade C option. Or palladium alloy per MIL-P-45209 option.
Tin plated “LF” product has 100% tin plating in the interface and has not been tested for whisker growth in all interconnect environments

3.3.3 All other areas. Will be plated with 50 microinches of nickel per QQ-N-290, Class 2.

3.4 Design and Construction

The header shall be a multi-piece assembly having one or two rows of contacts with solderable tail ends for installation in .040 inch diameter holes in printed wiring boards of standard thickness. The Bergstik® header contacts shall be insert molded or post-inserted in the insulator on rectangular grids of .100, .125, or .150 inches or multiples thereof and shall be available in straight or right angle configurations. The Bergstrip™ header contacts shall be post-inserted into the insulator on rectangular grids of .100 inch and shall be available in straight configurations. The contacts shall be available in various above- and below-board lengths suitable for use as 0.025 inch square male disconnects or as similarly configured wrapposts for solderless wrapped connections in accordance with MIL-STD-1130.

3.4.1 Polarization (Optional). Removal or omission of individual contact(s) shall provide polarization/keying to insure correct orientation of the header and an appropriately configured mating part.

3.4.2 Workmanship. Headers shall be uniform in quality and shall be free from burrs, voids, chips, blisters, holes, sharp edges, or other defects that will adversely affect life or serviceability.

3.5 Electrical Characteristics

3.5.1 Insulation Resistance. The insulation resistance of the unmated and unsoldered headers shall be not less than 5000 megohms when measured in accordance with MIL-STD-1344, Method 3003. The following details shall apply:

a. Test Condition - 500 volts DC applied for l minute.
b. Points of Measurement - Between individually paired adjacent and opposing contacts.

3.5.2 Dielectric Withstanding Voltage. There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current (>1 milliampere) when the unmated and unsoldered header is tested in accordance with MIL-STD-1344, Method 3001. The following details shall apply:

a. Test Potential - See Table I.
b. Test Duration - 50 seconds.
c. Test Condition - I (760 Torr - sea level).
d. Points of Measurement - Between individually paired adjacent and opposing contacts.

TABLE I - DIELECTRIC WITHSTANDING VOLTAGE

Contact Spacing (inch)	Test Voltage VRMS
.100	1500
.125	1500
.150	1500

3.6 Mechanical Characteristics

3.6.1 Contact Retention. Individual contacts in an unsoldered header shall withstand a load applied in either direction, along the contact axis, without dislodgement from the insulator, of 5.0 pounds in the case of insert molded contacts and 2.0 pounds in the case of post inserted contacts.

3.7 Environmental Conditions

3.7.1 Thermal Shock. After exposure of an unmated and unsoldered header to alternate periods of extreme high and low temperature, there shall be no evidence of cracking or crazing of the insulator (not include open knit line) or other physical damage to the header. The dielectric withstanding voltage shall be not less than 750 volts RMS 60 HZ (see Paragraph 3.5.2). The following details shall apply:

a. Test Conditions - B (1 hour cycles).
b. Temperature Range - -65^{O} to 105^{O} C - Nylon
-65^{O} to 130^{O} C - PCT,PPS & LCP

3.7.2 High Temperature Life. After exposure of an unmated and unsoldered header to a high temperature operating environment, the insulation resistance of the header shall be not less than 5,000 megohms (see Paragraph 3.5.1). The test shall be in accordance with MIL-STD-202, Method 108. The following details shall apply:

a. Test Chamber Temperature -105^{O} C ($\pm 2^{O}$)-Nylon;130^{O}C($\pm 2^{O}$) PCT,PPS & LCP
b. Test Condition (Duration) B (250 hours).
c. Operating Conditions - No Current

3.8 Solderability

Plated pins shall be capable of passing BUS-19-002.

3.9 Re-Qualification product
If either of the following conditions occurs, the responsible product engineer shall initiate re-qualification testing, consisting of all applicable parts of the qualification test matrix, table II

a. A significant design change is made to the existing product. A significant change shall include, but is not limited to, changes in the contact material composition, contact material thickness, contact force, contact surface geometry, underlying material composition, underlying material thickness, insulation design, contact base material or contact lubrication requirements.

b. A significant change is made to the manufacturing process which impacts the product form, fit or function.

c. A significant event occurs during the production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Equipment Calibration

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with ISO 9000.

4.2 Inspection Condition

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:

a. Temperature: $25^{o}C \pm 5^{o}$ C.
b. Relative Humidity: 30 to 80%.
c. Barometric Pressure: Local Ambient

4.3 Qualification Inspection

Qualification inspection shall be performed on sample units produced with equipment and procedures normally used in production.

4.3.1 Sample. The qualification sample shall consist of two of the largest size headers of the particular design, configuration, and type that are the subject of the test.

4.3.2 Test Sequence. The sample headers shall be subjected to the inspections specified in Table II in the order shown.

TABLE II - CONNECTOR QUALIFICATION INSPECTION

Examination or Test	Paragraph	Test Sample 1	Test Sample 2
Contact Retention	3.6.1	X	-
Insulation Resistance	3.5.1	X	-
Dielectric Withstanding Voltage	3.5.3	X	-
Thermal Shock	3.7.1	X	-
Insulation Resistance	3.5.1	X	-
Dielectric Withstanding Voltage	3.5.2	X	-
High Temperature Life	3.7.2	X	-
Insulation Resistance	3.5.1	X	-
Dielectric Withstanding Voltage	3.5.2	X	-
Solderability	3.8	-	X

4.4 Acceptance Inspection

Acceptance inspection shall consist of the examinations specified in Table III. Appropriate in-process inspection may, at the option of FCI, be substituted for the indicated lot sampling/inspection provided the process output quality level is maintained.

TABLE III - ACCEPTANCE INSPECTION

Examination	AQL Major	AQL Minor
Visual and Mechanical	1.0%	4.0%

4.4.1 Inspection Lot. An inspection lot shall consist of all headers produced under essentially the same conditions and offered for inspection at one time.

4.4.2 Sampling Plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105, General Inspection Level II. The Acceptance Quality Level (AQL) shall be as specified in Table III. Major and minor defects shall be as defined in MIL-STD-105.

4.4.3 Reject Lots. Rejected lots shall be reworked to correct the defects or screened to remove defective units and resubmitted for inspection.

4.4.4 Deposition of Sample Units. Sample units that have been subjected to the acceptance inspection shall be considered deliverable on the contract or purchase order.

REVISION RECORD

REV	PAGE	DESCRIPTION	EC#	DATE
B	5		V11389	05/10/91
C	2 to 7	Delete MIL-STD-1130, add polyphenylene sulfide (PPS) to 3.2.2, delete 3.4.1,3.5.3,3.6.2 & 3.6.3. Delete Figure 1. Delete Wrappost Torque and Contact Retention from table II	V12665	09/24/91
D	3	Update 3.2.2 to add PCT resin, delete the word minimum on 3.3.1 & 3.3.3	V40635	03/17/94
E	1 to 8	Add Bergstrip™ Header to Title. Replace connector with header. Replace unterminated with unsoldered. Replace DuPont with Berg.	V80237	02/04/98
F	1,3,5	Change Title from Packaging Spec to Product Spec. 3.3.2 change 150 to 120. 3.7.1 & 3.7.2 add temperature -65 ° to 130 ° add name (Nylon).	V81231	06/23/98
G	All	Revised format to be consistent with GS-01-001, and change BERG, Dupont, etc. references to FCI.	V01904	07/28/00
H	1 to 3	Add lead free information	M06-0161	3/13/06
J	5	Add r-qualification notes 3.9	M07-0280	06/20/07
K	1,3,4,5	Delete notes 1.2,change note 3.3 of the plating, delete ‘‘cracks and scratches’’, add ‘‘not include open knit line’’.	ELX-N-006141	19/09/11