

NUMBER <b>GS-12-1319</b>	TYPE <b>GENERAL PRODUCT SPECIFICATION</b>	<b>Amphenol ICC</b>	
TITLE <b>BarKlip vertical connector</b>		PAGE <b>1 of 10</b>	REVISION <b>A</b>
		AUTHORIZED BY <b>Feng Zheng</b>	DATE <b>May 30,2019</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

## 1.0 Objective

This specification defines the performance, test, quality and reliability requirements of the BarKlip vertical connector.

## 2.0 Scope

This specification is applicable to the termination characteristics of the BarKlip vertical connector which provides a means of bringing high current from Bus bar to Bus bar.

## 3.0 Ratings

3.1 Operating Voltage Rating: 480 VDC (The voltage rating is also dependant on the application)

3.2 Operating Current Rating: 300A

3.3 Operating Temperature Range =-40 ~ 105 (°C)<sup>1</sup>

Operating temperature is tested in accordance with EIA-364-17 Method A for 1008 hours at 105°C per EIA-364-1000 Table 8 to meet field temperature of 75°C for 10 years field life.

*Note 1: includes the terminal temperature rise when powered*

## 4.0 Applicable Documents

### 4.1 FCI Specifications

4.1.1 Engineering drawing 10129416 / 10134620

### 4.2 Industry or Trade Association standards

4.2.1 Telcordia GR-1217

### 4.3 National or International Standards

4.3.1 Flammability: UL-94V-0

4.3.2 EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications.

### 4.4 Laboratory Reports - Supporting Data

DL-2016-01-003

### 4.5 Safety Agency Approvals

UL: E66906 Vol. 1 Sec. 152

## 5.0 Requirements

### 5.1 Qualification

Connectors furnished under this specification shall be capable of meeting the qualification test requirements specified herein.

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## 5.2 Material

The material for each component shall be as specified herein or equivalent.

Power Contacts – High Conductivity Copper alloy

Housing – Thermoplastic, UL 94V-0

## 5.3 Finish

The finish for applicable components shall be as specified herein or equivalent.

Contact area: AGT™ for power contacts

Tail area: Tin plated over Nickel

## 5.4 Design and Construction

Connectors shall be of the design, construction, and physical dimensions specified on the applicable product drawing. There shall be no cracks, burrs, or other physical defects that may impair performance.

## 5.5 Connectors Mating Part (Bus bar)

Recommended material: Copper, solid blade

Material Thickness: 2.0±0.1 mm; 3.0±0.1 mm; 4.0±0.1 mm

Surface roughness in contact area: Ra 1.6 µm maximum

Plating in contact area: 3 µm min Silver over 1.27 µm min Nickel

Mating edges: 0.5 mm minimum, rounded or chamfered

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## 6.0 Electrical Characteristics

### 6.1 Contact Resistance, Low Level (LLCR)

6.1.1 The low level contact resistance shall not exceed 0.20 milliohms initially and after any treatment and/or environmental exposure.

Measurements shall be in accordance with EIA 364-23.

The following details shall apply:

- a. Test Voltage - 20 milli-volts DC max open circuit.
- b. Test Current - Not to exceed 100 milli-amperes.

6.1.2 Power contacts tested at specified Current (300A DC):

The contact resistance at a specified current shall not exceed 0.20 mΩ (milliohms) initially and after test only applicable to Test Group 7 when measured in accordance with EIA 364-06.

### 6.2 Insulation Resistance

The insulation resistance of mated connectors shall not be less than 5000 Megohms initially and 1000 Megohms after environmental exposure. Measurements shall be in accordance with EIA 364-21.

The following details shall apply:

- a. Test Voltage – 500 volts DC.
- b. Electrification Time - 1 minutes, unless otherwise specified.
- c. Points of Measurement - Between adjacent contacts.

### 6.3 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown when mated connectors are tested in accordance with EIA 364-20.

The following details shall apply:

- a. Test Voltage - 1000 volts AC RMS.
- b. Test Duration - 60 seconds.
- c. Test Condition - 1 (760 Torr - sea level).
- d. Points of Measurement - Between adjacent contacts.
- e. Unless otherwise specified, the leakage current shall not exceed 1 mA

### 6.4 Current Rating

The temperature rise above ambient shall not exceed 30 deg C at any point in the system when all contacts are powered at 300 amperes.

The following details shall apply:

- a. Ambient Conditions – still air at lab room ambient
- b. Reference - EIA 364-70

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## 7.0 Mechanical Characteristics

### 7.1 Mating/Unmating Force

The mating force shall not exceed 40 Newtons (one connector/at nominal status contact).

The unmating force shall not be less than 6 Newtons (one connector/at nominal status contact).

The following details shall apply:

- a. Cross Head Speed – 25.4mm per minute.
- b. Lubrication - No additional lubricant shall be added to production test samples.
- c. Utilize free floating fixtures.
- d. Reference – EIA 364-13, Method A.

### 7.2 Durability (preconditioning)

The connector pairs shall be capable of withstanding 50 mating/un-mating cycles. When used for preconditioning treatment, 20 mating/un-mating cycles shall be applied prior to mechanical/environmental exposure.

- a. Cycling Rate: 127 mm per minute maximum
- b. Use free floating fixtures
- c. Reference – EIA 364-09

### 7.3 Durability

With connector mating and un-mating samples for 50 cycles with a bus bar conductor.

- a. Cycling Rate: 127 mm per minute.
- b. Use free floating fixtures
- c. Reference – EIA 364-09

### 7.4 Reseating

Manually un-mate/mate the interconnect system once.

- a. Sample Size – Dependent upon current test group, refer to specific sample sizes.
- b. Failure Criteria - No evidence of physical damage.
- c. No lubrication to be used during cycling.

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## 8.0 Environmental Conditions

After exposure to the following environmental conditions in accordance with the specified test procedure and/or details, the product shall show no physical damage and shall meet the electrical and mechanical requirements per paragraphs 6.0 and 7.0 as specified in the Table 1 test sequences. Unless specified otherwise, assemblies shall be mated during exposure.

### 8.1 Thermal Shock – EIA 364-32, Method A, Test condition II.

- a. Number of Cycles - 25
- b. Temperature Range - Between -65°C and +105°C
- c. Time at Each Temperature - 30 minutes
- d. Transfer Time - 5 minutes, maximum

### 8.2 Cyclic Temperature & Humidity – EIA 364-31 method III (cyclic temperature)

- a. Relative Humidity - 80% to 98%
- b. Temperature - 25°C~65°C
- c. Duration - 240 hours
- d. Omit step 7b (vibration) where applicable

### 8.3 High Temperature Life – EIA 364-17, Method A.

- a. Test Temperature - 105± 2°C
- b. Test Duration - 1000 hours

### 8.4 High Temperature Life(preconditioning) – EIA 364-17, Method A.

- a. Test Temperature - 105± 2°C
- b. Test Duration - 72 hours

### 8.5 Mixed Flowing Gas corrosion (MFG) – EIA 364-65

- a. Class - IIA
- b. Duration - 14 days
- c. ½ of samples mated for 336 hours, ½ of samples unmated for 168 hours, then mated for final 168 hours.
- d. After 7 days duration, test the LLCR. After 14 days duration, also test the LLCR.

### 8.6 Vibration (Random) – EIA 364-28

- a. Test Condition - Test Condition V, Test condition C (50-2000Hz, 9.26g rms)
- b. Duration – 120 minutes along each of three orthogonal axes
- c. Mounting - Rigidly mount assemblies

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- d. No discontinuities greater than 1.0 microseconds
- 8.7 Mechanical Shock – EIA 364-27
- a. Condition - Test condition A (50G, 11 millisecond, half-sine pulse type)
  - b. Shocks - 3 shocks in both directions along each of three orthogonal axes (18 shocks total)
  - c. Mounting - Rigidly mount assemblies
  - d. No discontinuities greater than 1.0 microseconds.
- 8.8 Thermal Disturbance – EIA 364-110
- a. Number of Cycles - 10
  - b. Temperature Range - Between 15 ±3°C and +85 ±3°C
  - c. Dwell time for each extreme temperature – 5 minutes minimum
  - d. Ramp rate - a minimum of 2°C per minute

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## 9.0 QUALITY ASSURANCE PROVISIONS

### 9.1 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 ANSI Z-540 and ISO 9000.

### 9.2 Inspection Conditions

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

- a. Temperature: 25 +/- 5 deg C
- b. Relative Humidity: 30% to 60%
- c. Barometric Pressure: Local ambient

### 9.3 Sample Quantity and Description

The sample size and description is listed for each test in the appropriate section of this document.

### 9.4 Acceptance

9.4.1 Electrical and mechanical requirements placed on test samples as indicated in paragraphs 6.0 and 7.0 shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with this product specification shall meet the stated requirements.

9.4.2 Failures attributed to equipment, test setup, or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

### 9.5 Qualification Testing

Qualification testing shall be performed on sample units produced with equipment and procedures normally used in production. The test sequences shall be as shown in the qualification test table. Data shall be provided with the samples noting production history: production lot codes for components and assemblies, components and assemblies produced to print revision, verification of plating composition and thickness, etc.

### 9.6 Re-Qualification Testing

If any of the following conditions occur, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix.

- a. A significant design change is made to the existing product which impacts the product form, fit or function. Examples of significant changes shall include, but not be limited to, changes in the plating material composition or thickness, contact force, contact surface geometry, insulator 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 production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

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9.7 Qualification Test Table

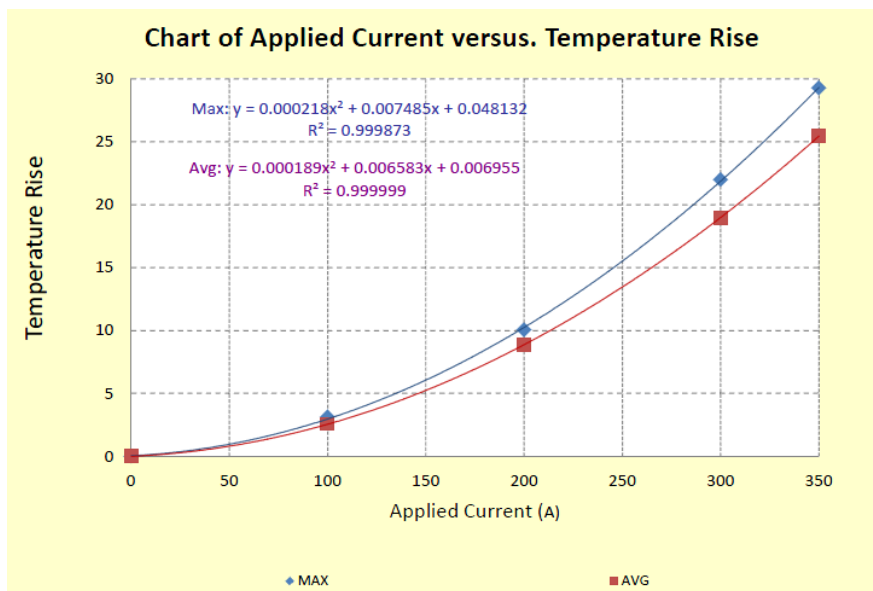
Test Items	Section	Test Sequence						
		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Examination of Product	5.4	1,8	1,8	1,10	1,10	1,11	1,7	1,4
Contact Resistance(Low Level)	6.1	2,7	2,5,7	2,5,7,9	2,5,7,9	2,5,7 (After7days),8 (After14days) ,10		3
Insulation Resistance	6.2						2,5	
Dielectric Withstanding Voltage	6.3						3,6	
Current Rating (T-rise: 30°C Max.)	6.4							2
Mating Force	7.1	3						
Un-mating Force	7.1	4,6						
Durability (Preconditioning)	7.2		3	3	3	3		
Durability	7.3	5					4	
Reseating	7.4		6	8		9		
Thermal Shock	8.1			4				
Cycling Temperature& Humidity	8.2			6				
High Temperature Life	8.3		4					
High Temperature Life (preconditioning)	8.4				4	4		
Mixed Flowing Gas	8.5					6		
Random Vibration	8.6				8			
Mechanical Shock	8.7				6			
Thermal disturbance	8.8							
Samples quantity(PCS)		5	5	5	5	5	5	3



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## 10.0 Appendix

The T-rise curves for BarKlip Vertical is as follows.



The maximum temperature rise reached to 30°C when the connector was energized at 353.9A current.

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**REVISION RECORD**

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A	All	Release product specification	N/A	2019/05/30