

# Bidal Electricals Pvt Ltd

## TEST REPORT

**SCOPE OF WORK**

FAA Certification Testing - L-823 Class A Style 7

**REPORT NUMBER**

103833049CRT-001

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Test Report			
<b>Client</b>	Bildal Electricals Pvt Ltd	<b>Test Location</b>	Intertek Testing Services NA
<b>Address</b>	152 Udyog Kendra Extn II	<b>Address</b>	3933 US Rt 11
	Ecotech III, Greater Noida		Cortland, NY 13045
	201306 U.P		USA
	India		
<b>Client Contact</b>	Brenton Heble	<b>Quote Number</b>	Qu-00938192
<b>Phone</b>	(972) 248-7691	<b>Test Start Date</b>	May 12th, 2019
<b>Email</b>	<a href="mailto:BHeble@deantech.com">BHeble@deantech.com</a>	<b>Completion Date</b>	March 23rd, 2020

Test Report
U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular, FAA Specification for L-823 Plug and Receptical, Cable Connectors, AC No. 150/5345-26D dated September 30, 2008.

Spec	Test name	Clause	Result
26D	Visual Examination	Sec. 3	Pass
26D	Dielectric Test	4.2.2	Pass
26D	Bond Test	4.2.3	Pass
26D	Mechanical Connection Test	4.2.4	Pass
26D	Electrical Connection Test	4.2.5	Pass
26D	Weathering	4.2.6	NT
26D	Metal Bond Test	4.2.7	Pass

Results Key	
Pass	Compliant
Fail	Non-compliant
NC	Not Completed
NT	Not Tested in this project
NA	Test not Applicable

*Lynette Smith*

Lynette Smith  
Engineer  
Lighting

*Chris W. Metcalf*

Christopher W. Metcalf  
Engineering Supervisor  
Lighting

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Sample Information				
Date Rec.	Intertek ID	Description	Condition	Model No.
3/11/2019	CRT1903111051-001-4 thru -9	[6] L-823 Style 1 Integro (Certified)	Production	BE10P
3/11/2019	CRT1903111051-001-10 thru -15	[6] L-823 Style 7	Production	BE20R
3/11/2019	CRT1903111051-001-16 thru -23	[8] "A" Dia. Pin / "H" Dia. Socket	Production	BE20S1P/A / BE20S7R/H
3/11/2019	CRT1903111051-001-24 thru -31	[8] "B" Dia. Pin / "J" Dia. Socket	Production	BE20S1P/B / BE20S7R/J
8/28/2019	CRT1908281033-001-1 thru -6	[6] L-823 Style 7	Production	BE20R
8/28/2019	CRT1908281033-001-7 thru -12	[6] "A" Dia. Pin / "H" Dia. Socket	Production	BE20S1P/A / BE20S7R/H
8/28/2019	CRT1908281033-001-13 thru -18	[6] "B" Dia. Pin / "J" Dia. Socket	Production	BE20S1P/B / BE20S7R/J
12/10/2019	CRT1912101011-001-13 thru -18	[6] L-823 Style 7	Production	BE20R
2/14/2020	CRT2002140951-001-1 thru -6	[6] L-823 Style 7	Production	BE20R

Further Sample Description	
Type:	II
Class:	A
Style:	7
Molding Material:	TPV, Santoprene, 101-73

Sample Modification Log	
Date	Modification description
8/28/19	Client corrected the "L" dimension to be in compliance with AC 26D
8/28/19	Client provided new pins and sockets made of minimum 98% copper
12/13/19	Client provided new samples, without any design modifications

**Sample Information**

**Picture(s)**

**Style 7 Receptacle**



**Pin/Socket Pairs**



**Visual Examination**

Ref. Para	Requirement for L-823 Connectors	Style 7	
		Measured or Observed	Result (P/F)
3.4.1 General	Does each connector conform to the dimensional and construction requirements shown on the applicable figure?	Observed	P
3.4.2 Housing	Is the connector housing molded from natural and/or synthetic elastomeric materials serving both as insulation and sheath to fully enclose the pins and sockets of the connectors?	Observed	P
	Do material compounds used in connector housings contain more than 25 pounds (11 kg) of carbon black per 100 pounds (45 kg) of elastomer?	Observed	P
3.4.3 Pins and Housing	Are the pins and sockets designed to conform to the dimensional and construction requirements as indicated on the applicable figure of this specification?	Observed	P
	Are the sockets slotted and spring loaded to insure good electrical contact as required by Paragraph 3.3.1?	Observed	P
	Are pins and sockets made of materials that contain at least 98 percent copper?	Observed	P
	Are sockets fully annealed and supplied with a copper beryllium sleeve-type spring which assures adequate contact pressure and protects the socket slots from filling with insulating compound during assembly and subsequent use?	Observed	P
	Are the pins made from material at least "half hard" with the crimping section full annealed?	Observed	P
	Is the contact portion of the pin left "stock hard"?	Observed	P
	Is the hardness transition limited to the locking section of the pin?	Observed	P
	Are the pin and socket electro-plated with tin or other suitable material to provide good electrical contact?	Observed	P
3.4.4.1 Class A	Is the pin for the Style 3 connector provided with a visual indication that verifies proper assembly position?	NA	NA
	Are pins and sockets held perpendicular to the face of the block?	Observed	P
	Are suitable electrical conductors mechanically and electrically connected to the pin(s) or socket(s), and then is the housing molded per 3.4.2?	Observed	P
3.4.5 Marking	Do the pins of the Type II plugs meet the pinch/pull requirements of par. 3.4.4.1?	NA	NA
	Are each plug and receptacle marked with the manufacturer's identification and L-823 designation with style number, i.e., L-823, Style 3?	Observed	P
3.4.6 Caps	Are caps supplied with Class A connectors to protect plugs and receptacles prior to final connection?	Observed	P
	When a series short circuiting plug-type cap is required for a receptacle, are jumpers connected to the proper pins?	NA	NA
	Are the mating dimensions the same as the corresponding plug?	Observed	P
	Is the short circuit cap permanently marked with an "S"?	NA	NA

Style:	7	Type:	II	Class:	A			
Sample:	-001-1	-001-2	-001-3	-001-4	-001-5	-001-6	Specified	Specified
Dimen.	Measure	Measure	Measure	Measure	Measure	Measure	Min(in.)	Max(in.)
E	0.437	0.438	0.444	0.439	0.441	0.442	0.425	0.445
G	1.000	0.991	0.993	0.993	1.000	0.985	0.969	1.000
L	0.355	0.347	0.348	0.357	0.349	0.352	0.343	0.358
M	0.698	0.700	0.697	0.701	0.691	0.703	0.684	0.704
Pass/Fail	Pass	Pass	Pass	Pass	Pass	Pass		

**Complies:**  YES  NO

Tested By/Engineer:	Lynette Smith	Signature or initials:	<i>Lynette Smith</i>	Comp. Date:	3/18/2020
Reviewed By:	cwm	Signature or initials:	<i>[Signature]</i>		
Test Equipment Used:	1,2	Sample No:	CRT1903111051-001-4 thru -9, CRT1908281033-001-1 thru -18		
Amb (°C):	24		RH%	52	

**Dielectric Test**

After the conclusion of the test in paragraph 4.2.2.1, each plug and receptacle being tested must be mated and immersed in a tap water bath at room temperature, (68 - 77° F (20-25 °C)). Immerse not more than 2 feet (0.6 m) of cable, 1 foot (0.3 m) of the plug, and 1 foot (0.3 m) of the receptacle.

While immersed, each connector assembly must be manually flexed for 2 minutes and then left immersed for a minimum of 24 hours with its cable leads flexed and maintained 180° from its longitudinal axis.

Measure the insulation resistance between conductors of each connected assembly after the 24 hour soaking period. The resistance measurements must be taken 1 minute after a test voltage of 4.7 kV dc has been applied for 5 minutes to Type II connectors and 15 kV dc to Type I connectors. The minimum resistance between conductors must be 25,000 megohms.

Heat the tap water to 149° F (65 °C ) without removing the assemblies and maintain this temperature for at least 1 hour.

Again measure the resistance between the conductor(s) and water, and between conductors with a 500-volt source. The minimum acceptable resistance after the heated soaking period must be 10,000 megohms.

**Results**

Initial Water Temperature	
Requirement	Measured
20°C - 25°C	22.3 °C

Manually Flexed for Two Minutes					
Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
✓	✓	✓	✓	✓	✓

20°C - 25°C Soak Period						
Start			Complete			
Date	Time	Water Temperature	Date	Time	Water Temperature	
9/4/2019	9:30	22.3 °C	9/5/2019	9:30	22.6 °C	

Insulation Resistance after 20°C - 25°C Soak Period; WHITE LEAD							
Sample	Conditioning Voltage	Test Condition		Measured		Requirement	(P/F)
1	5KVdc for Five Minutes	One Minute Rest	500V Source	90500	MΩ	25,000 Megaohms	P
2				913000	MΩ		P
3				750000	MΩ		P
4				942000	MΩ		P
5				791000	MΩ		P
6				816000	MΩ		P

Insulation Resistance after 20°C - 25°C Soak Period; BLACK LEAD							
Sample	Conditioning Voltage	Test Condition		Measured		Requirement	(P/F)
1	5KVdc for Five Minutes	One Minute Rest	500V Source	603000	MΩ	25,000 Megaohms	P
2				904000	MΩ		P
3				1030000	MΩ		P
4				693000	MΩ		P
5				1030000	MΩ		P
6				621000	MΩ		P

**Dielectric Test Continued**

65°C Soak Period							
Start				Complete			
Date	Time	Water Temperature	°C	Date	Time	Water Temperature	°C
9/5/2019	12:05	65.1	°C	9/5/2019	13:05	65.2	°C

Insulation Resistance after 65°C Soak Period; WHITE LEAD						
Sample	Conditioning Voltage	Test Condition	Measured		Requirement	(P/F)
1	None	500V Source	651000	MΩ	10,000 Megaohms	P
2			1176000	MΩ		P
3			1040000	MΩ		P
4			975000	MΩ		P
5			727000	MΩ		P
6			763000	MΩ		P

Insulation Resistance after 65°C Soak Period; BLACK LEAD						
Sample	Conditioning	Test Condition	Measured		Requirement	(P/F)
1	None	500V Source	673000	MΩ	10,000 Megaohms	P
2			1030000	MΩ		P
3			843000	MΩ		P
4			692000	MΩ		P
5			966000	MΩ		P
6			602000	MΩ		P

**Complies:**  YES  NO

Tested By:	S. Hammond	Signature or initials:	<i>SH</i>	Comp. Date:	9/5/2019
Engineer:	Lynette Smith	Signature or initials:	<i>Lynette Smith</i>		
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>		
Test Equipment Used:	2,6,7,8	Sample No:	CRT1903111051-001-4 to -9, CRT1908281033-001-1 to -6		
Amb (°C):	25	RH%:	62		

**Bond Test**

The molded bond between cable and Class A connector must be subjected to a static longitudinal pull load of the magnitude per paragraph 3.3.2. When testing Class A, Type II, connectors of any style the two conductors must be pulled as a single cable, not as individual conductors. The connector must be held in a manner that does not impart a crimping or clamping action to the connector that would affect the pull test. The connector molding cavity, or a similarly shaped fixture, is acceptable for holding the connector. Separation between the molded on connector and the cable jacket or conductor insulation exceeding .03 inches must be cause for rejection.

Referencing 3.3.2 Bonding Strength. The completed Class A connector assembly must withstand a longitudinal pull of at least 30,000 pounds per square inch (psi) (207 Megapascals (MPa)), 75 percent of an average tensile strength of 40,000 psi, (276 MPa) for all wire sizes. Calculation of tensile strength should be done by considering the cross sectional area of the conductor only. Separation between the molded on connector and the cable must not exceed 0.03 inches (0.8 mm). The wires must be per with ASTM Specification B 33 and B 189.

**Results**

Individual Conductors per Cable	7	Number of Cables	2
Diameter of Single Conductor (in)	0.026	Total Conductor Area (in <sup>2</sup> )	0.0074
Longitudinal Pull Load (psi)	30000	Longitudinal Pull Load (lbs)	223

Sample	Type	Force Applied	Post Test Visual Inspection	(P/F)
CRT1908281033-001-1	II	223 lbs.	No seperation was observed	P
CRT1908281033-001-2	II	223 lbs.	No seperation was observed	P
CRT1908281033-001-3	II	223 lbs.	No seperation was observed	P
CRT1908281033-001-4	II	223 lbs.	No seperation was observed	P
CRT1908281033-001-5	II	223 lbs.	No seperation was observed	P
CRT1908281033-001-6	II	223 lbs.	No seperation was observed	P

**Complies:**  YES  NO

Tested By:	S. Hammond	Signature or initials:	<i>SH</i>
Engineer:	Lynette Smith	Signature or initials:	<i>Lynette Smith</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	2,11,12	Sample No:	CRT1908281033-001-1 to -6
Amb (°C):	22	RH%	45
		Completion Date:	9/9/2019



**Mechanical Connection Test**

Each plug and receptacle intended for mating must be connected together and subjected to the static pull load per paragraph 3.3.3. Any evidence of separation of the connection must be cause for rejection. An increasing load must be applied to the connector assembly until separation occurs. No damage must occur to the mating components when the connected plug and receptacle are separated by the greater static pull load. Any evidence of damage to plugs, receptacles, conductors, and/or the connector bond will be cause for rejection.

**Results**

Sample	Static Pull		Pull to Disconnected		Evaluation	
	Applied	Separation	Approx. Break Force		Damage	(P/F)
CRT1908281033-001-1	10 Lbs.	None	22	Lbs.	None	P
CRT1908281033-001-2		None	20	Lbs.	None	P
CRT1908281033-001-3		None	22	Lbs.	None	P
CRT1908281033-001-4		None	23	Lbs.	None	P
CRT1908281033-001-5		None	20	Lbs.	None	P
CRT1908281033-001-6		None	23	Lbs.	None	P

**Complies:**  YES  NO

Tested By:	S. Hammond		Signature or initials:	<i>SH</i>	Comp. Date	9/6/2019
Engineer:	Lynette Smith		Signature or initials:	<i>Lynette Smith</i>		
Reviewed By:	cwm		Signature or initials:	<i>cwm</i>		
Test Equipment Used:	2,9		Sample No:	CRT1903111051-001-4 to -9, CRT1908281033-001-1 to -6		
Amb (°C):	23.1	RH%	44.2			

**Electrical Connection Test**

The voltage drop measurements must be made across mated connectors while conducting their rated current. The contacts of six sample plugs and six certified receptacles (six contact pairs for Type I connectors and twelve contact pairs for Type II connectors) are measured with 20 A for type II and 25 A for type I flowing through the conductors. The voltage drop across the contacts of a connected plug and receptacle must not exceed 7.5 mV for the Type I connectors and must not exceed 6.0 mV for the Type II connectors.

**Results – 3.3.1 of AC 150/5345-26D**

"A" Dia. Pin / "H" Dia. Socket

Sample	Type	Spec. min. Rating	Type II 6.0 mV	Measured Current	Measured Voltage Drop (mV)	Pass/Fail
		Type II	Max. Voltage drop			
	II	600V Req.	6.0 mV Req.	20A Req.	Large Pin	
-001-7	II	600V	6.0 mV	20.1	1.36	Pass
-001-8	II	600V	6.0 mV	20.1	1.96	Pass
-001-9	II	600V	6.0 mV	20.1	3.49	Pass
-001-10	II	600V	6.0 mV	20.0	1.59	Pass
-001-11	II	600V	6.0 mV	20.1	2.35	Pass
-001-12	II	600V	6.0 mV	20.1	1.78	Pass

"B" Dia. Pin / "J" Dia. Socket

Sample	Type	Spec. min. Rating	Type II 6.0 mV	Measured Current	Measured Voltage Drop (mV)	Pass/Fail
		Type II	Max. Voltage drop			
	II	600V Req.	6.0 mV Req.	20A Req.	Large Pin	
-001-13	II	600V	6.0 mV	20.1	1.55	Pass
-001-14	II	600V	6.0 mV	20.1	1.31	Pass
-001-15	II	600V	6.0 mV	20.0	2.33	Pass
-001-16	II	600V	6.0 mV	20.1	1.23	Pass
-001-17	II	600V	6.0 mV	20.1	1.25	Pass
-001-18	II	600V	6.0 mV	20.1	5.08	Pass

Complies:  YES  NO

Tested By:	S. Hammond	Signature or initials:	<i>S-H</i>
Engineer:	Lynette Smith	Signature or initials:	<i>Lynette Smith</i>
Reviewed By:		Signature or initials:	<i>Ham</i>
Test Equipment Used:	2,8,13,14	Sample No:	CRT1908281033-001-7 thru -18
Amb (°C):	24	RH%	69
		Completion Date:	9/10/2019

**Metal Bond Test**

Class A assemblies must have their connector plug and receptacle placed in water, with 20 psi air pressure applied from the free end of the cable, for 10 minutes per paragraph 4.2.7. There must be no air bubbles emanating from the assembly observed in the water.

**Results**

Sample	Applied pressure (PSI)	Air Pressure Start (min)	Air Pressure Stop (min)	Bubbles Present (Y/N)
CRT2002140951-001-1	20	0	10	N
CRT2002140951-001-2	20	0	10	N
CRT2002140951-001-3	20	0	10	N
CRT2002140951-001-4	20	0	10	N
CRT2002140951-001-5	20	0	10	N
CRT2002140951-001-6	20	0	10	N

**Complies:**  YES  NO

Tested By:	S. Hammond	Signature or initials:	<i>SH</i>
Engineer:	Lynette Smith	Signature or initials:	<i>Lynette Smith</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	15,16,17	Sample No:	CRT2002140951-001-1 thru -6
Amb (°C):	19	RH%	16
		Completion Date:	2/20/2020

Equipment list				
#	Intertek ID No.	Description	Manufacturer	Calibration Due
1	N1344	Digital Caliper	Brown & Sharpe	17-Jun-2020
2	L190	Hygro-Thermometer	Testo	26-Feb-2020
3	M176	Digital Multimeter	Keithley	12-Apr-2019
4	M236	Multimeter	Fluke	28-Apr-2019
5	A186	CT	Pearson	20-Nov-2020
6	V338	Megaohmmeter	AMEC	17-Jan-20
7	M312	Stopwatch	Control Company	2-Feb-20
8	M245	Multimeter, Digital	Fluke Corporation	10-May-20
9	F363A	Force Gauge	Imada Inc.	22-Mar-20
10	M265	Pressure Gauge	U. S. Gauge	9-May-20
11	N126	Outside Micrometer	Mitutoyo	17-May-20
12	F544	Hanging Crane Scale	Ametek	31-Jan-20
13	A198	Current Monitor, Wideband	Pearson Electronics, Inc.	8-Jul-22
14	M176	Digital Multimeter	Keithley	12-Jun-20
15	M309	Stopwatch	Control Company	6-Nov-20
16	M310	Thermo-Hygrometer	Testo	5-Dec-20
17	P439	Pressure Gauge	USG	10-Jul-20

Note: For measurement uncertainty, refer to the calibration certificates for all the test equipment located in the equipment files