
Mini-Circular Plastic Connector (CPC)

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the mini-CPC connector system, which is a small circular connector system used primarily in industrial, instrumentation, and transportation applications. The system is offered in wire-to-wire and wire-to-panel configurations. The system is available in two sizes: shell size 8, which provides contact configurations of 1 to 4 positions and shell size 11, which provides contact configurations of 5 to 9 positions. The connector system also provides environmental sealing to level IP67.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

2.1. TE Documents

102-950:	Quality Specification
109-197:	Test Specification versus EIA and IEC Test Methods
114-13105:	Application Specification
501-19223:	Qualification Test Report

2.2. Industry Standards

EIA-364:	Electrical Connector/Socket Test Procedures Including Environmental Classifications
IEC 60529:	Degree of Protection Provided by Enclosures (IP Code)

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

Voltage: 250 volts AC/DC

Current: applicable current carrying capability is given in Table 1

Operating temperature: -55° to 105°C

Shell Size	Number of Contacts	Contact Finish	Current, Amps	
			22 AWG	30 AWG
8	4	Tin	5.0	3.2
	4	Gold	5.5	3.2
11	9	Tin	4.8	2.4
	9	Gold	4.7	2.4

i **NOTE**
The current rating is stable up to 75°C for higher temperature ratings see figures 3-10

3.4. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Test Description	Requirement	Procedure
Initial Examination of Product	Meets requirements of product drawing.	EIA-364-18 Visual and dimensional (C of C) inspection per product drawing.
Final Examination of Product	Meets visual requirements.	EIA-364-18 Visual inspection.
ELECTRICAL		
Low Level Contact Resistance	20 milliohms maximum	EIA-364-23 Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Insulation Resistance	5000 megohms minimum initial 1000 megohms minimum final	EIA-364-21 Test between adjacent contacts.
Withstanding Voltage	1-minute hold with no breakdown or flashover.	EIA-364-20, Condition I 1500 volts AC at sea level. Test between adjacent contacts.
Temperature Rise versus Current	30°C maximum temperature rise at specified current.	EIA-364-70, Method 1 Stabilize at a single-current level until 3 readings at 5 minute intervals are within 1°C.
MECHANICAL		
Sinusoidal Vibration	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition I Subject mated specimens to 10-55-10 Hz traversed in 1 minute with 1.5-mm [.06-in.] maximum total excursion. Two hours in each of 3 mutually perpendicular planes.
Mechanical Shock	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, Method A Subject mated specimens to 50 Gs half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.

Figure 1 cont.

Test Description	Requirement	Procedure
Durability	See Note.	EIA-364-9 Mate and unmate specimens for 120 cycles for gold-plated specimens and 20 cycles for tin-plated specimens at a maximum rate of 500 cycles per hour.
Mating Torque	Shell Size 8: 0.7 N-m (6.2 in-lbs) max Shell Size 11: 1.2 N-m (10.6 in-lbs) max	EIA-364-13 Measure coupling ring torque needed to mate specimens.
Unmating Torque	Shell Size 8: 0.06-0.70 N-m (0.5-6.2 in-lbs) Shell Size 11: 0.10-1.20 N-m (0.9-10.6 in-lbs)	EIA-364-13 Measure coupling ring torque needed to unmate specimens
Contact Retention	35.58 N [8 lb] minimum	EIA-364-29 Apply specified load at a rate of 4.4N (1 lb) per second, and hold for 6 seconds

ENVIRONMENTAL

Thermal Shock	See Note.	EIA-364-32, Test Condition VII Subject specimens to 5 cycles between -55 and 105°C.
Humidity-Temperature Cycling	See Note.	EIA-364-31, Method III Subject specimens to 10 cycles (10 days) between 25° and 65°C at 80 to 100% RH.
Temperature Life	See Note.	EIA-364-17, Method A, Test Condition 4, Test Time Condition C Subject mated specimens to 105°C for 500 hours.
Mixed Flowing Gas	See Note.	EIA-364-65, Class IIIA Subject mated specimens to environmental Class IIIA for 20 days.
Temporary Water Immersion	Meets requirements of IPx7	IEC 60529, IPx7
Dust Ingress	Meets requirements of IP6x	IEC 60529, IP6x



NOTE

This shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the product qualification and requalification test sequence.

Figure 1 end

3.5. Product Qualification and Re-Qualification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)				
	1	2	3	4	5
	TEST SEQUENCE (b)				
Initial Examination of Product	1	1	1	1	1
Low-Voltage Resistance	2,5,9	2,5,7,9	2,6,8		
Insulation Resistance			3,9		
Withstanding Voltage			4,10		
Temperature versus Current		3,10			
Vibration	7	8(c)			
Mechanical Shock	8				
Durability	4				
Mating Torque	3				
Unmating Torque	6				
Contact Retention			11		
Thermal Shock			5		
Humidity-Temperature Cycling		4(d)(e)	7		
Temperature Life		6			
Mixed Flowing Gas		4(d)(f)			
Temporary Immersion				2	
Dust Ingress					2
Final Examination of Product	10	11	12	3	3



NOTE

- (a) *Specimens shall be prepared in accordance with applicable instruction sheet and shall be selected at random from current production. Each test group shall consist of a minimum of 5 specimens.*
- (b) *Numbers indicate sequence in which tests are performed.*
- (c) *Discontinuities shall not be measured; energize at 18°C level for 100% loadings per 102-950.*
- (d) *Precondition specimens with 10 durability cycles.*
- (e) *Tin-plated specimens only.*
- (f) *Gold plated specimens only.*

Figure 2

+4 Pos, Tin plated contacts & wire size: 22AWG =>I=5.0A at $\Delta T=30K$

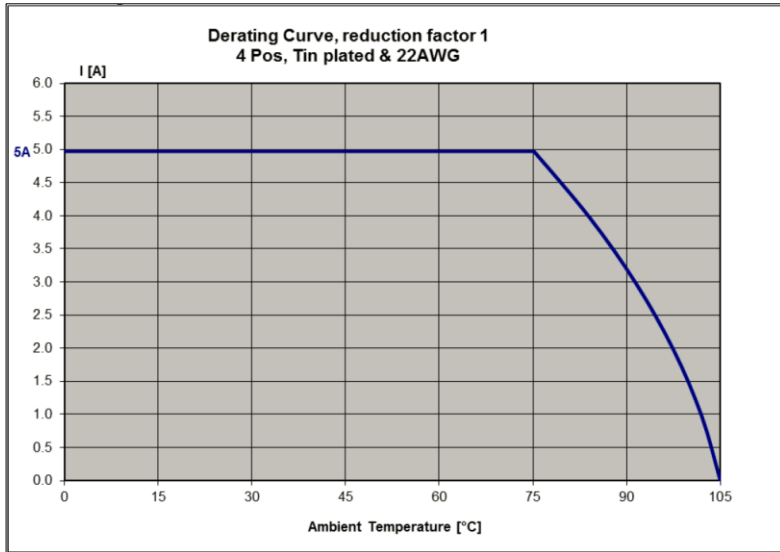


Figure 3

+9 Pos, Tin plated contacts & wire size: 22AWG =>I=4.8A at $\Delta T=30K$

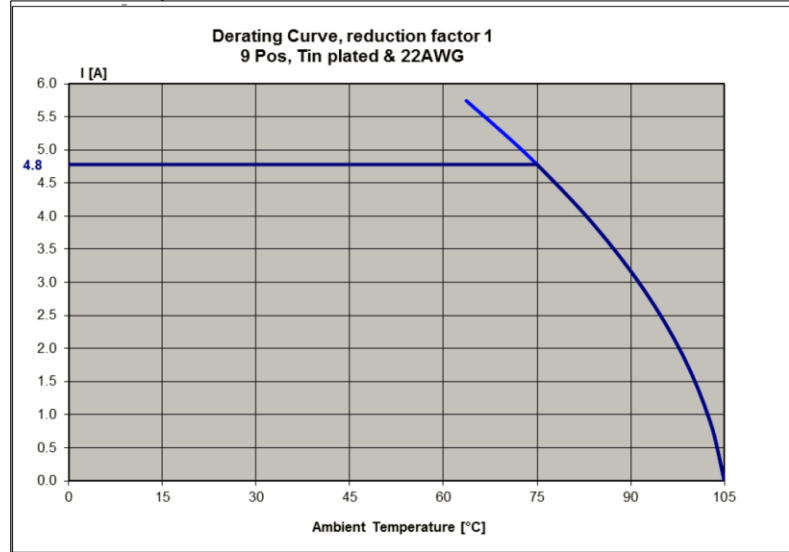


Figure 4

+4 Pos, Gold plated contacts & wire size: 22AWG =>I=5.5A at $\Delta T=30K$

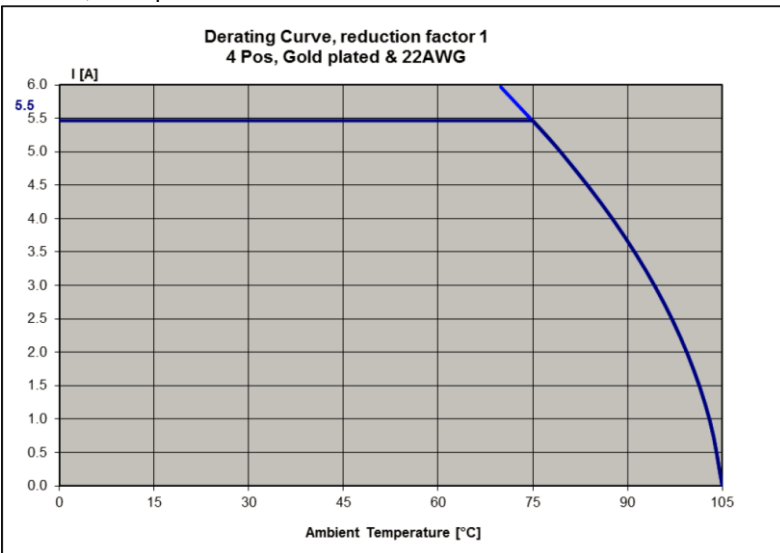


Figure 5

+9 Pos, Gold plated contacts & wire size: 22AWG =>I=4.7A at $\Delta T=30K$

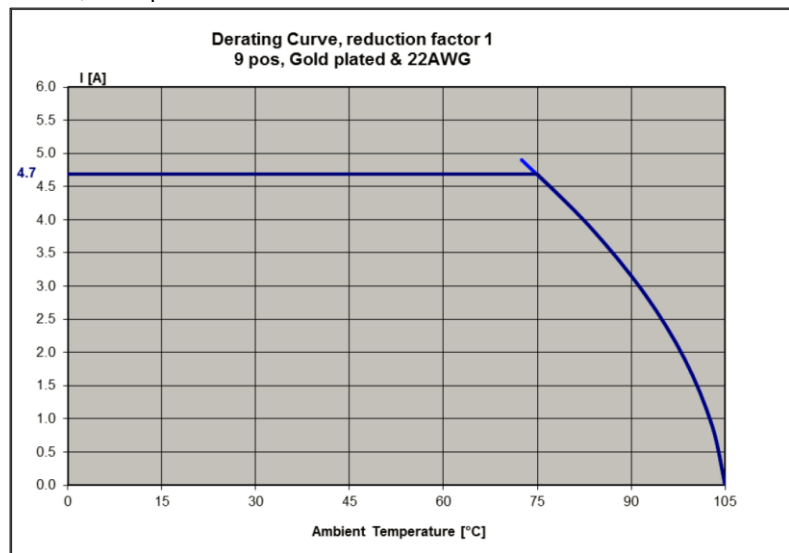


Figure 6

+4 Pos, Tin plated contacts & wire size: 30AWG =>I=3.2A at $\Delta T=30K$

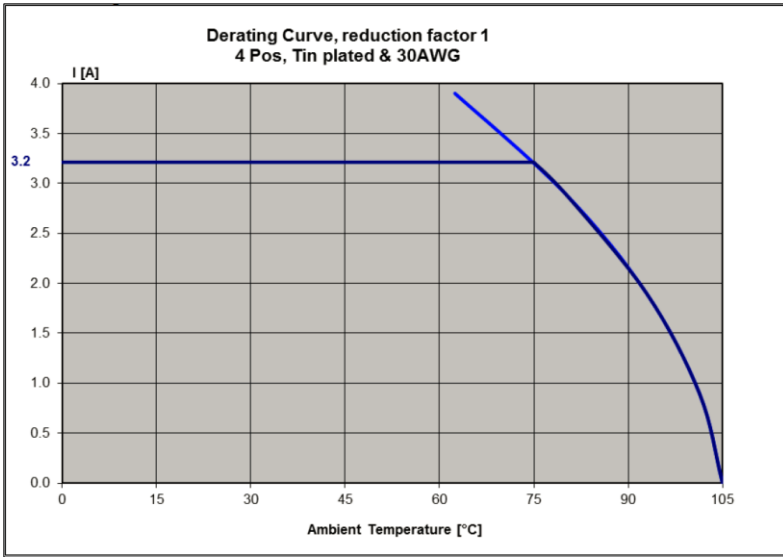


Figure 7

+9 Pos, Tin plated contacts & wire size: 30AWG =>I=2.4A at $\Delta T=30K$

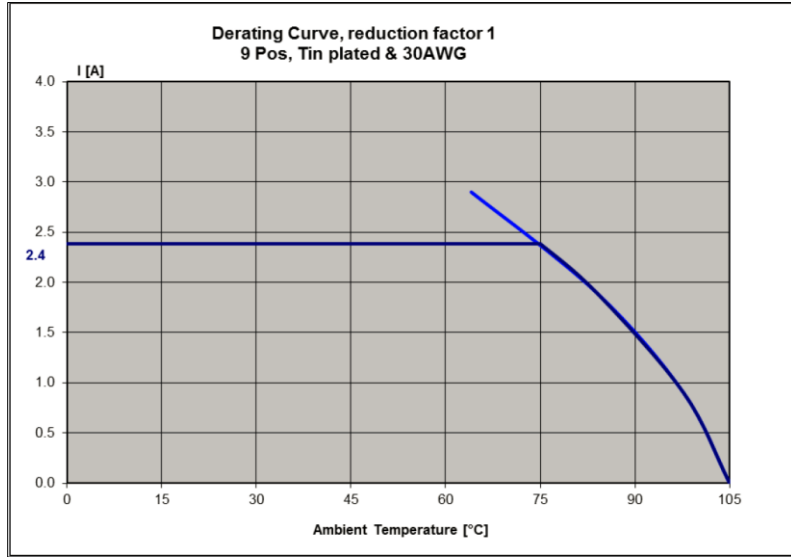


Figure 8

+4 Pos, Gold plated contacts & wire size: 30AWG =>I=3.2A at $\Delta T=30K$

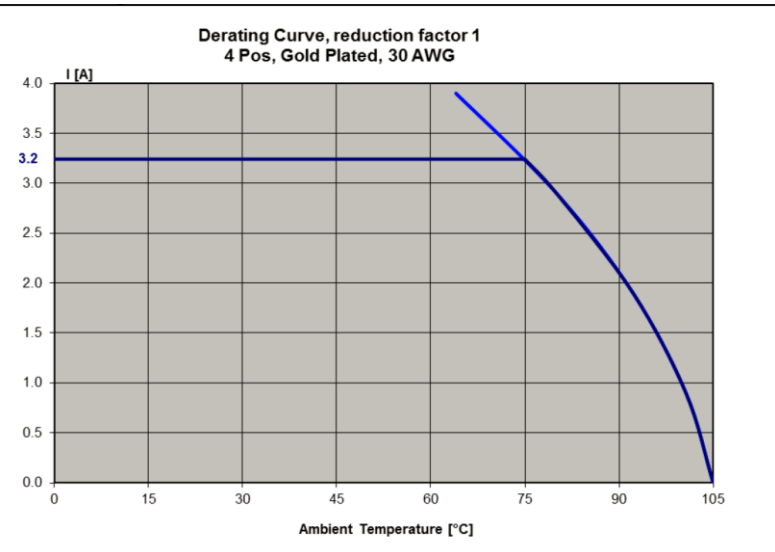


Figure 9

+9 Pos, Gold plated contacts & wire size: 30AWG =>I=2.4A at $\Delta T=30K$

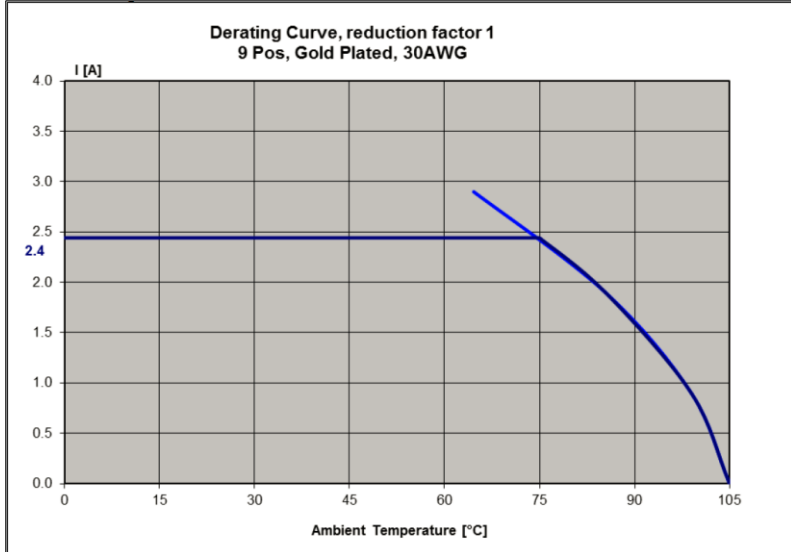


Figure 10