



DEUTSCH* Solid Contacts (HD)

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) DEUTSCH Solid Contact (HD) System.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Section 3.3 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

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

2.1. TE Connectivity (TE) Documents

- [109-1](#) General Requirements for Testing
- [114-151004](#) DEUTSCH Solid Pin and Socket Contact
- Product Drawings. XX = plating codes. See individual product drawings for available plating.

Product Drawing Pin	Size	Product Drawing Socket	Size
5960-203-04XX	4	5962-203-04XX	4
0460-204-04XX		0462-203-04XX	
0460-204-08XX	8	0462-203-08XX	8
0460-204-12XX	12	0462-203-12XX	12
0460-220-12XX		0462-210-12XX	
0460-256-12XX		0462-004-16XX	
0460-002-16XX		0462-007-16XX	
0460-202-16XX	16	0462-201-16XX	16
0460-215-16XX		0462-209-16XX	
0460-247-16XX		0462-221-16XX	
0460-264-16XX		0462-222-16XX	
2325529		2325584	
2300908		0462-006-16XX	
0460-010-20XX	20	0462-005-20XX	20
0460-202-20XX		0462-201-20XX	
2325531		2325530	

2.2 Industry Documents

- DIN 72551-6: Road Vehicles—Low-Tension Cables—Part 6: Single-Core, Unscreened with Thin Insulation Wall; Dimensions, Materials, Marking
- ISO 6722: Road Vehicles—60 V and 600 V Single-Core Cables—Dimensions, Test Methods, and Requirements
- SAE J1127: Low Voltage Battery Cable
- SAE J1128: Low Voltage Primary Cable
- SAE J2030: Heavy-Duty Electrical Connector Performance Standard

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Ratings

- Voltage: See connector product specification
- Current (Amp): See Appendix A for current temperature rise (T-Rise) open air without housing

Contact Size	Wire Size AWG ² [mm ²]	Current Rating (A)
4	4 [21.0-25.0]	100
	6 [13.0-16.0]	
8	8 [8.0-10.0]	60
	10 [5.0-6.0]	40
12	12 [2.5-3.0]	25
	14 [2.0]	18
16	14 [2.0]	13
	16 [1.0-1.5]	
	18 [0.75]	10
	20 [0.5]	7.5
	22 ³ [0.35]	5
	24 ³ [0.22]	3
20	16 [1.0-1.5]	7.5
	18 [0.75]	
	20 [0.5]	
	22 ³ [0.35]	5
	24 ³ [0.22]	3

- Temperature¹:
 - Nickel -55°C to +125°C
 - Tin -55°C to +125°C
 - Gold -55°C to +150°C
 - Palladium Nickel Gold -55°C to +150°C



NOTE

1. See connector product specification for connector temperature range.
2. Metric wire sizes are for references only. (All contacts were validated with AWG wires.)
3. 22 & 24 AWG specification for gold plating only.

3.3. Test Requirements and Procedures Summary

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

VISUAL

3.3.1. Examination of Product

- A. Procedure: SAE J2030
- B. Method: Visually inspected for use of materials, proper construction, correct part number and insert markings and over-all quality of workmanship. Damaged or improperly manufactured contacts, galling of metal parts, nicks and burrs of metal parts were considered adequate basis for rejection.
- C. Requirement: The contacts shall be correctly constructed, marked and shall show good quality and workmanship

3.3.2. Low Level Contact Resistance (Dry Circuit)

- A. Procedure: SAE J2030
- B. Method: Test with applied voltage not to exceed 20 mV open circuit and the test current shall be limited to 100 mA. The resistance of the equal length of wire (reference wire) shall be subtracted from the same reel as used for the connector wiring. Gold and tin plated contacts
- C. Requirement: See table

Wire Size AWG [mm ²]	Resistance mΩ max
16 [1.0]	6.0
18 [0.75]	7.5
20 [0.50]	11.0
*22 [0.35]	17.0
*24 [0.22]	23.0

*Gold Plating Only

3.3.3. Contact Resistance (Voltage Drop)

- A. Procedure: SAE J2030
- B. Method: Using test currents as defined. The resistance of an equal length wire (reference wire) shall be subtracted from the actual readings to determine the added resistance of the terminal. The reference wire shall be from the same reel as used for the connector wiring.
- C. Requirement: See table

Contact Size	Wire Size AWG [mm ²]	Test Current (A)	Voltage Drop max mV
4	4 [21.0-25.0]	100	60
	6 [13.0-16.0]		
8	8 [8.0]	60	
	10 [5.0-6.0]	40	
12	12 [2.5-3.0]	25	
	14 [2.0]	18	
16	14 [2.0]	13	
	16 [1.0-1.5]		
	18 [0.75]	10	
	20 [0.50]	7.5	
	*22 [0.35]	5	
	*24 [0.22]	3	
20	16 [1.0-1.5]	7.5	
	18 [0.75]		
	20 [0.50]	5	
	*22 [0.35]	5	
	*24 [0.22]	3	

*Gold Plating Only

3.3.4. Maximum Current Capability (open air without housing)

- A. Procedure: USCAR-2
- B. Method: Samples shall be mounted in an enclosure which protects the immediate environment from external movement of air. Measure and record the voltage drop across 150mm of the conductor to be used for the test. Attach conductor ends of the terminal pairs to form one continuous series circuit and attach the thermocouples to each mated pair. Mount the circuit in the draft-free enclosure. Use at least 10 terminal pairs. Test samples at room temperature then slowly adjust the power supply until current level of 50% of the maximum expected value for the particular wire size. Wait at least 15 minutes for the circuit temperature to stabilize. Increase in increments or 10% of that value until a temperature rise over ambient of 55°C was achieved. Record ambient temperature, temperature of each terminal pair interface and millivolt drop across each mated pairs.
- C. Requirement: T-rise curve graph at 20% above current rating.

3.3.5. Crimp Tensile

- A. Procedure: SAE J2030
- B. Method: The tensile strength of the crimped connection shall be tested by using suitable apparatus at a constant speed within the range of 25 mm/min. If the terminal has a cable insulation crimp it shall be rendered mechanically ineffective. Samples are pulled to destruction.
 - a. Size 4-20 Crimp Specification: 114-151004
- C. Requirement: See table

Contact Size	Wire Size AWG [mm²]	Tensile Strength Minimum lbf [N]
4	4 [21.0-25.0]	300 [1334]
	6 [13.0-16.0]	
8	8 [8.0]	125 [556]
	10 [5.0-6.0]	90 [400]
12	12 [2.5-3.0]	75 [334]
	14 [2.0]	70 [311]
	16 [1.0-1.5]	35 [156]
	18 [0.75]	25 [111]
16	14 [2.0]	70 [311]
	16 [1.0-1.5]	35 [156]
	18 [0.75]	25 [111]
	20 [0.50]	15 [67]
	*22 [0.35]	10 [45]
	*24 [0.22]	5 [22]
20	16 [1.0-1.5]	35 [156]
	18 [0.75]	25 [111]
	20 [0.50]	15 [67]
	*22 [0.35]	10 [45]
	*24 [0.22]	5 [22]

*Gold Plating Only

3.3.6. Contact Retention

- A. Procedure: SAE J2030
- B. Method: The contacts shall be subjected to a direct pull. The minimum value specified shall be applied for 1 minute. The pull is to be exerted on the conductor by means of a tension-testing machine or equivalent to prevent sudden or jerking force during test.
- C. Requirement: See table. The terminal shall maintain its original position in the connector throughout the test.

Contact Size	Pull-Out Force lbf [N] min
4	35 [156]
8	
12	30 [133]
16	25 [111]
20	20 [89]

3.3.7. Durability

- A. Procedure: SAE J2030
- B. Method: Test samples shall be mated and unmated complete cycles at room temperature.
 - a. Nickel: = 100 cycles
 - b. Gold: = 100 cycles
 - c. Palladium Nickel Gold: = 100 cycles
 - d. Tin: = 20 cycles
- C. Requirement: No evidence of damage to the contacts, contact plating which may be detrimental to reliable contact performance.

3.3.8. Terminal-Terminal Insertion Force

- A. Procedure: Not Applicable
- B. Method: Sockets shall be mounted in a suitable fixture for applying gradually increasing loads for the insertion using a test pin. Insert test pin .250 [6.35] deep into socket.
- C. Requirement: See table

Contact Size	Insertion Force max lbf [N]	Test Pin Ø inch [mm]
4	25.0 [111.2]	.2260 [5.740]
8	8.0 [35.6]	.1430 [3.632]
12	2.80 [12.5]	.0945 [2.400]
16	1.80 [8.0]	.0635 [1.613]
20	1.30 [5.8]	.0410 [1.041]

3.3.9. Contact Overlap (electrical engagement)

- A. Procedure: Not Applicable
- B. Method: Theoretical proof by design calculation
- C. Requirement: ≥ .050 [1.27]. Depends on connector design

ENVIRONMENTAL

3.3.10. Temperature Life

- A. Procedure: SAE J2030
- B. Method: The wired mated connectors shall be subjected to 1000 hours at +125°C without current flowing.
- C. Requirement: Contact resistance not to exceed 100mV after test.

3.3.11. Thermal Cycle

- A. Procedure: Not Applicable
- B. Method: Cycle mated connectors from -55°C to +125°C. Connectors to remain at each temperature extreme for one (1) hour minimum. Mated connectors are to be cycled a total of 20 complete cycles.
- C. Requirement: Contact resistance not to exceed 100mV after test.

3.3.12. Thermal Shock

- A. Procedure: SAE J2030
- B. Method: Subjected test sample to 10 cycles. One cycle shall consist of a soak time at -55°C then a transition within 2 min to an ambient of +125°C, with a soak time there and then a transition back to -55°C within 2 min. The soak times shall be established as the time necessary to bring the internal connector temperature on test to within 5°C of each of the ambient temperatures.
- C. Requirement: Contact resistance not to exceed 100mV after test.

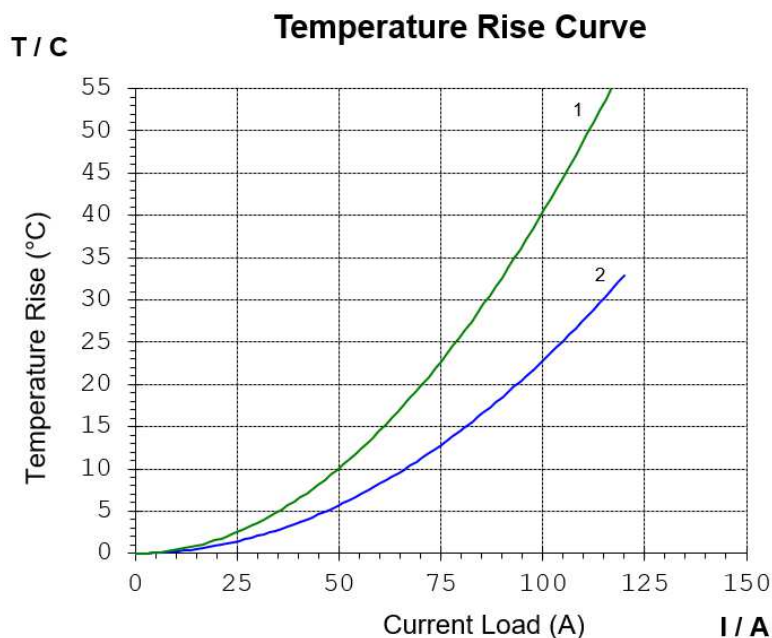
3.4. Appendix A. Current Temperature Rise (T-Rise) Open Air Without Housing

Size 4 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-204-0490	0462-203-04141	6 AWG	1
0460-204-04141		4 AWG	2
5960-203-04141	5962-203-04141	4 AWG	2



NOTE

T-rise curves indicate testing at 20% above rated current.

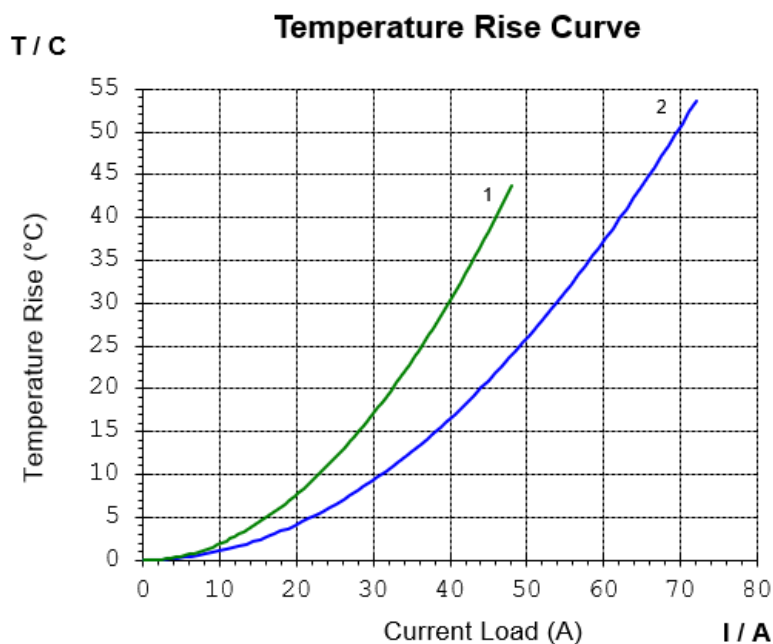


Size 8 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-204-08141	0462-203-08141	10 AWG	1
		8 AWG	2



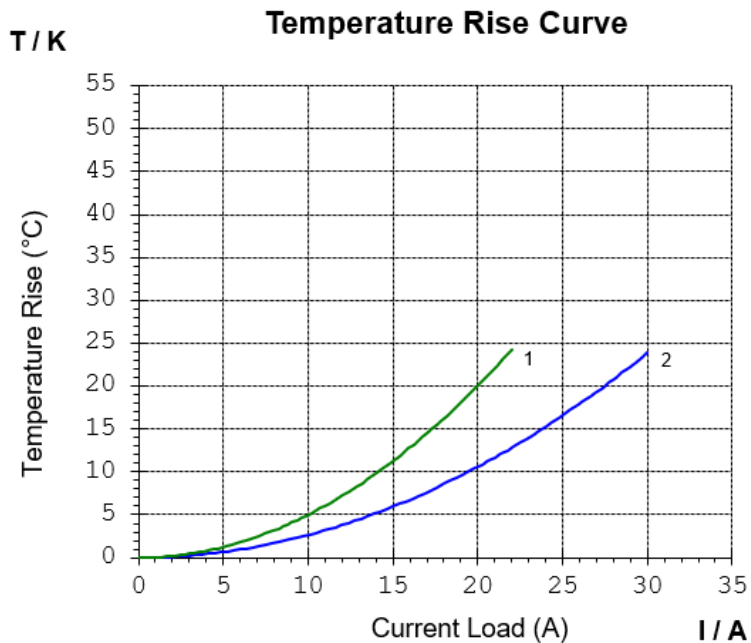
NOTE

T-rise curves indicate testing at 20% above rated current.



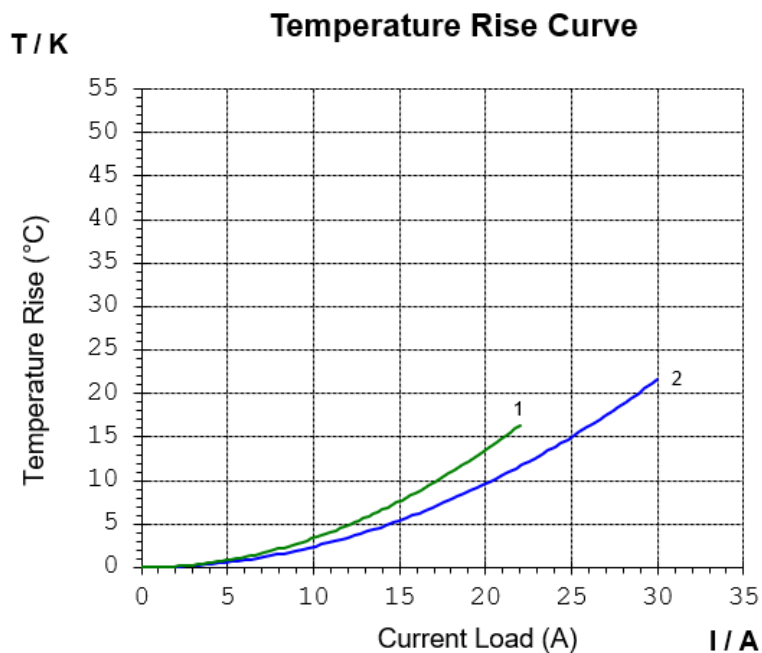
Size 12 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-204-12141	0462-203-12141	14 AWG	1
		12 AWG	2

i **NOTE**
T-rise curves indicate testing at 20% above rated current.



Size 12 - Gold			
Pin Part Number	Soc Part Number	Wire	Curve
0460-220-1231	0462-210-1231	14 AWG	1
		12 AWG	2

i **NOTE**
T-rise curves indicate testing at 20% above rated current.



Size 16 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-202-16141	0462-201-16141	20 AWG	1
		18 AWG	2
		16 AWG	3
0460-215-16141	0462-209-16141	14 AWG	4

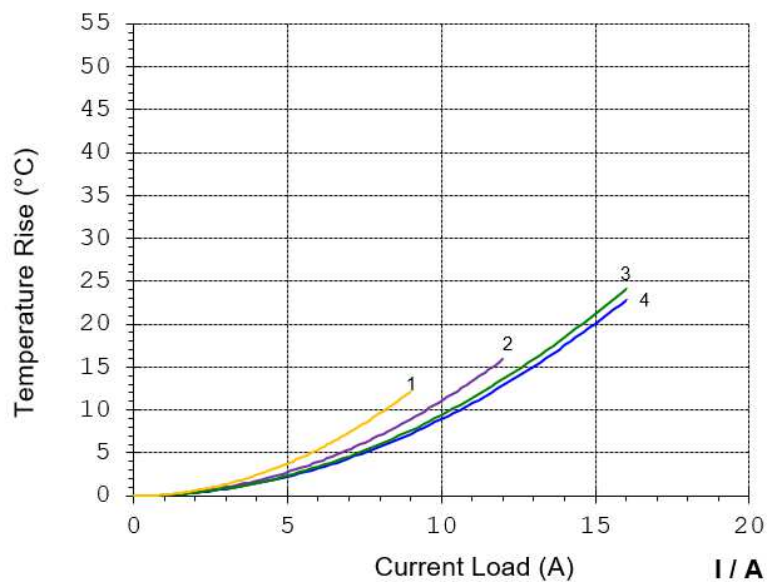


NOTE

T-rise curves indicate testing at 20% above rated current.

T / K

Temperature Rise Curve



Size 20 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-202-20141	0462-201-20141	20 AWG	1
0460-010-20141	0462-005-20141	18 AWG	2
		16 AWG	3

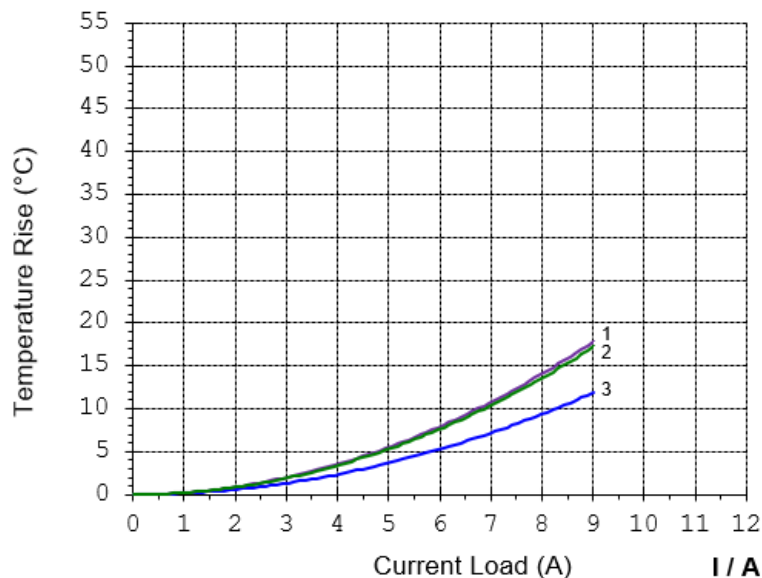


NOTE

T-rise curves indicate testing at 20% above rated current.

T / K

Temperature Rise Curve



Size 20 - Gold			
Pin Part Number	Soc Part Number	Wire	Curve
0460-202-2031	0462-201-2031	20 AWG	1
0460-010-2031	0462-005-2031	18 AWG	2
		16 AWG	3

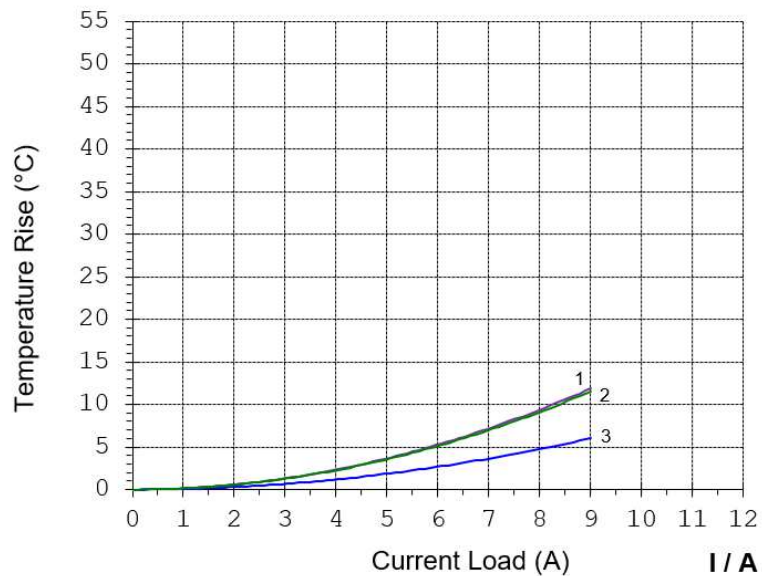


NOTE

T-rise curves indicate testing at 20% above rated current.

T / K

Temperature Rise Curve



3.5 Revision History

Rev Ltr	Brief Description of Change	Date	Dwn	Apvd
A	Initial Release	01-Sep-2018	DM	DM
B	<ul style="list-style-type: none"> 1) Page 1, Section; 2.1 strikethrough obsoleted drawings in the product drawing table. 2) Page 2, Section 3.2, Temperature, changed Tin max to +125°C and added Palladium Nickel Gold. 3) Page 4, Figure 2, Durability row, added Palladium Nickel Gold: = 1000 cycles. 	07-Sep-2018	DD	DM
C	<ul style="list-style-type: none"> 1) Page 1, 2.1 Section Hyper link Updated for 114 Spec 2) Page 2, 3.2 Section Wire Size information for Size12 Contact Updated 3) Page 3, 3.3 Section, LLCR, Wire Size information for 18 AWG Updated in mm² 4) Page 3, 3.3 Section, Contact Resistance, Wire Size information for Size12 Contact Updated in mm² 5) Page 4, 3.3 Section, Crimp Tensile, Wire Size information for Size12 and Size16 Contacts Updated in mm² 	24-Jan-2019	AK	DM
D	<ul style="list-style-type: none"> 1) Section 3.2. (is) Current (Amp). See Appendix A for current temperature rise (t-rise) without housing (was) Current (Amp) 2) Section 3.2 in table (is) Current Rating (A) (was) Maximum Current (A) 3) Section 3.3 Converted tabulated performance requirements to paragraph style. 4) Added 3.3.4. Maximum Current Capability test 5) Added Appendix A: T-Rise curves 	06-May-2020	DM	DM
E	<ul style="list-style-type: none"> 1) Page 1, Section 2.1, Add 2 Part Numbers to table. 2300908 & 0462-006-16XX. 2) Page 2, Section 3.2, Add Note 2 (IS) Metric wire sizes are for references only. (All contacts were validated with AWG wires.) 3) Page 2, Section 3.2, Add Note 3 (IS) 22 & 24 AWG specification for gold plating only. 4) Page 2, Section 3.2, removed 10mm² from size 8AWG. Add 22 & 24 AWG for size 16, 24 AWG for size 20. 5) Page 2, Section 3.3.2, Add 24 AWG Low Level Contact Resistance to table 6) Page 3, Section 3.3.3, removed 10mm² from size 8 AWG. Add 22 & 24 AWG for size 16, 24 AWG for size 20. 7) Page 4, Section 3.3.5, removed 10mm² from size 8 AWG. Add 22 & 24 AWG for size 16, 24 AWG for size 20. 8) Page 5, Correction Formatting, (IS) 3.3.8, 3.3.9, 3.3.10, 3.3.11, 3.3.12 (WAS) 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5 	20-Aug-2020	CL	IG