

DEUTSCH* Solid Contacts (HD) T-Rise Validation

1. INTRODUCTION

1.1. Purpose

Testing was performed on DEUTSCH Solid Contacts to determine T-rise curves. Test procedures are given in USCAR-2 rev 6, Feb 2013.

1.2. Scope

This report covers the electrical performance of the solid contacts. Testing was performed at the Winston-Salem Electronic Components Test Laboratory in 2018 and 2019. The test file numbers for this testing are listed in Figure 1. This documentation is on file at, and available from Industrial Commercial Transportation business unit.

Test Group	Test Report
1	WE-20180983ACL
	WE-20181178ACL
	WE-20181179ACL
	WE-20181180ACL
	WE-20190619ACL
	WE-20190620ACL
	WE-20190621ACL
	WE-20190622ACL

Figure 1

1.3. Conclusion

Current temperature rise (T-Rise) curves were generated for the DEUTSCH Stamped and Formed contacts as tested per the sequences shown in Figure 3 of this document.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the part numbers given in Figure 2 were used for testing.

DEUTSCH PART NUMBER	DESCRIPTION	TEST GROUP
0460-204-0490	Size 4 Solid, Pin, Nickel, 6 AWG	1
0462-203-04141	Size 4 Solid, Socket, Nickel, 6 AWG	
5960-203-04141	Size 4 Solid, Pin, Nickel, 4 AWG	
5962-203-04141	Size 4 Solid, Socket, Nickel, 4 AWG	
0460-204-08141	Size 8 Solid, Pin, Nickel, 8-10 AWG	
0462-203-08141	Size 8 Solid, Socket, Nickel, 8-10 AWG	
0460-204-12141	Size 12 Solid, Pin, Nickel, 12-14 AWG	
0462-203-12141	Size 12 Solid, Socket, Nickel, 12-14 AWG	

Figure 2 cont.

DEUTSCH PART NUMBER	DESCRIPTION	TEST GROUP
0460-220-1231	Size 12 Solid, Pin, Gold, 12-14 AWG	1
0462-210-1231	Size 12 Solid, Socket, Gold, 12-14 AWG	
0460-202-16141	Size 16 Solid, Pin, Nickel, 16-20 AWG	
0462-201-16141	Size 16 Solid, Socket, Nickel, 16-20 AWG	
0460-202-1631	Size 16 Solid, Pin, Gold, 16-20 AWG	
0462-201-1631	Size 16 Solid, Socket, Gold, 16-20 AWG	
0460-215-16141	Size 16 Solid, Pin, Nickel, 14 AWG	
0462-209-16141	Size 16 Solid, Socket, Nickel, 14 AWG	
0460-202-20141	Size 20 Solid, Pin, Nickel, 20 AWG	
0462-201-20141	Size 20 Solid, Socket, Nickel, 20 AWG	
0460-202-2031	Size 20 Solid, Pin, Gold, 20 AWG	
0462-201-2031	Size 20 Solid, Socket, Gold, 20 AWG	
0460-010-20141	Size 20 Solid, Pin, Nickel, 18-16 AWG	
0462-005-20141	Size 20 Solid, Socket, Nickel, 18-16 AWG	
0460-010-2031	Size 20 Solid, Pin, Gold, 18-16 AWG	
0462-005-2031	Size 20 Solid, Socket, Gold, 18-16 AWG	

Figure 2 end

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature: 15° to 35°C

Relative humidity: 25 to 75%

1.6. Qualification Test Sequences

TEST OR EXAMINATION	TEST GROUP (a)
	1
	TEST SEQUENCE (b)
Visual Examination	1,7
Voltage Drop	2,4
Terminal Cycling	3
Maximum Test Current Capability	5
Current Cycling	6

(a) Specimens were prepared in accordance production drawings and were selected at random from current production.

- Groups 1 specimens consisted of the following:
 - Size 4 Nickel: 4 AWG and 6 AWG
 - Size 8 Nickel: 8 AWG and 10 AWG
 - Size 12 Gold and Nickel: 12 AWG and 14 AWG
 - Size 16 Nickel: 14 AWG, 16 AWG, 18 AWG, 20 AWG
 - Size 20 Gold and Nickel: 16 AWG, 18 AWG, 20 AWG

(b) Numbers indicate sequence that tests were performed.

Figure 3

2. SUMMARY OF TESTING

2.1. Visual Examination (Groups 1)

- A. Procedure: SAE/USCAR-2 Revision 6
- B. Method: Perform an examination of the samples with the naked eye under fluorescent lights. Each test sample to be visually examined for manufacturing or material defects, such as cracks, tarnishing, flash, etc.
- C. Requirement: No physical defects detrimental to product performance.
- D. Result: **PASSED**

2.2. Voltage Drop (Groups 1)

- A. Procedure: SAE/USCAR-2 Revision 6
- B. Method: Each mated terminal pair was subjected to 25A and voltage was allowed to fluctuate to maintain constant current. Measurements were taken on the data acquisition system using voltage sense lead bundles. The overall resistance measurement included bulk wire, two crimps, bulk terminal material, and terminal interface. The bulk wire was subtracted out of all readings before reporting them.
- C. Requirement: Evaluation
- D. Result: **PERFORMED**

2.3. Terminal Cycling (Groups 1)

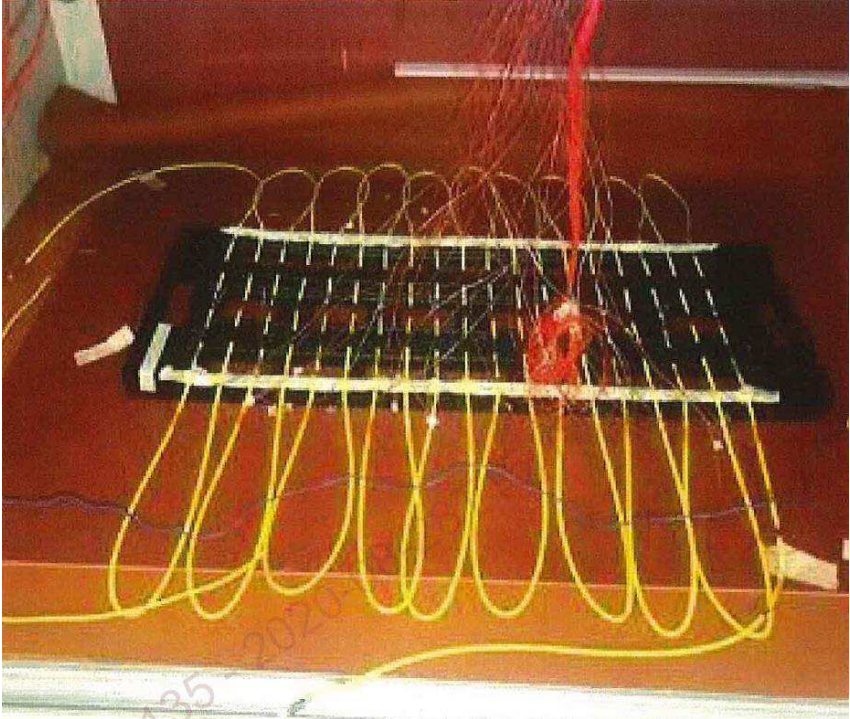
- A. Procedure: SAE/USCAR-2 Revision 6
- B. Method: Each terminal pair was engaged and disengaged a total of 10 times by hand. Great care was taken to minimize terminal rotation and inserted to the proper depth.
- C. Requirement: Conditioning
- D. Result: **PERFORMED**

2.4. Maximum Current Carrying Capability (Groups 1)

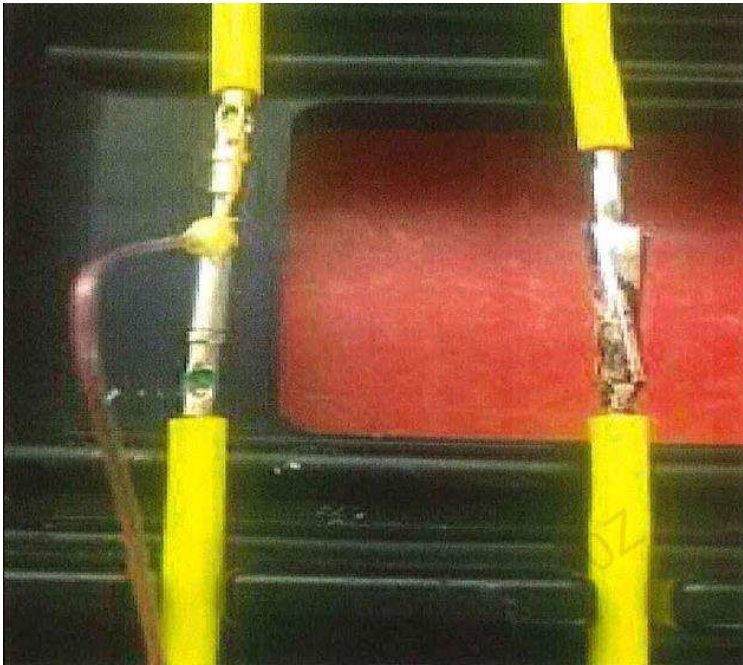
- A. Procedure: SAE/USCAR-2 Revision 6
- B. Method: Test samples were arranged in a draft-free enclosure in a horizontal attitude a minimum of 2 inches apart on the bottom of the enclosure. The ambient probe was placed 6 inches from the test samples and on the same horizontal attitude as the test samples. T-Rise measurements were made with the data acquisition system. Samples were energized at a current level and allowed to maintain thermal stability. Thermal stabilization was achieved when the temperature rise of 3 consecutive readings taken at 5-minute intervals differ at most 1°C (1.8°F). Once the test sample is considered stable at that current level, data is recorded, and the current is increased to the next level. This was repeated until a 55°C T-Rise was reached.
- C. Requirement: Evaluation
- D. Result: **PERFORMED**

2.5. Current Cycling (Groups 1)

- A. Procedure: SAE/USCAR-2 Revision 6
- B. Method: Each terminal pair was cycled at the specified current for that group. Current was applied for 45 minute and then removed for 15 minutes. This was considered to me 1 cycle and repeated 1007 more times. A voltage drop, and t-rise measurement was recorded 30 minutes into the on portion of the cycle and then once per week.
- C. Requirement: 55°C maximum T-rise during current cycling.
- D. Result: **PASSED**



Test Group in Series Setup

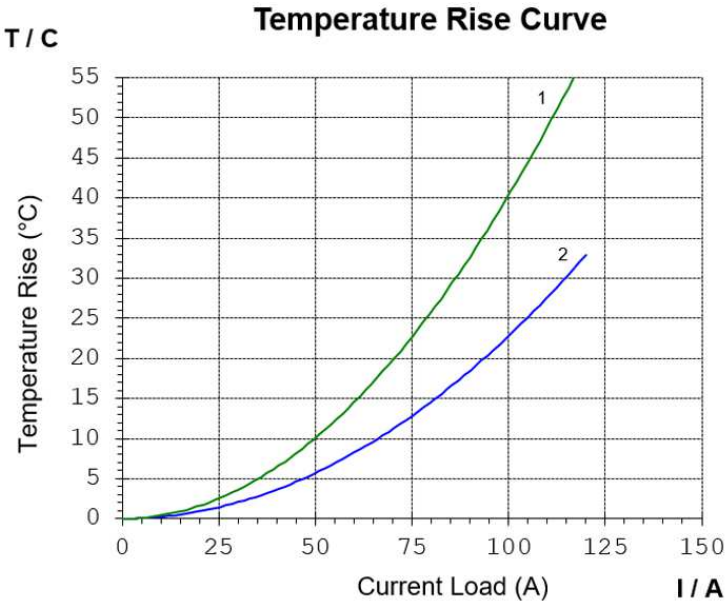


Thermocouple Placement

3.1. Appendix: Current Temperature Rise (T-Rise) Open Air Without Housing

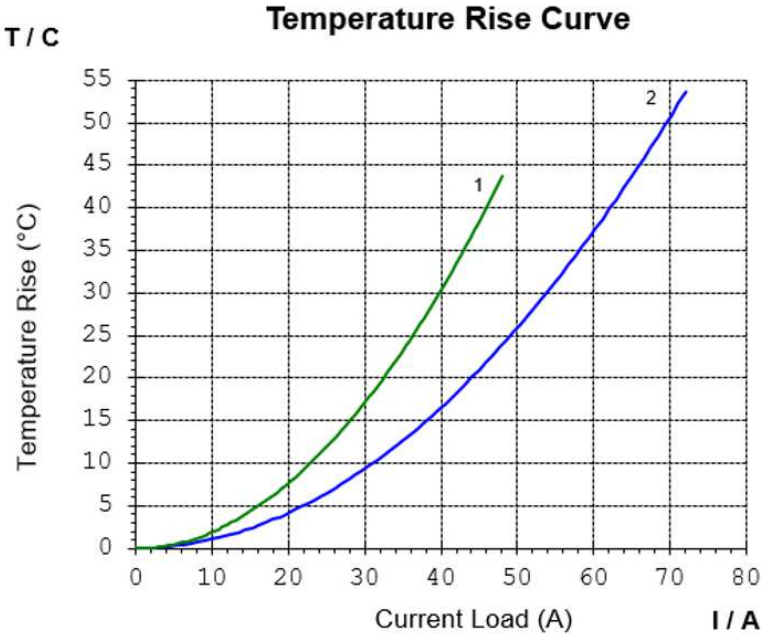
Size 4 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-204-0490	0462-203-04141	6 AWG	1
0460-204-04141		4 AWG	2
5960-203-04141	5962-203-04141	4 AWG	2

i **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

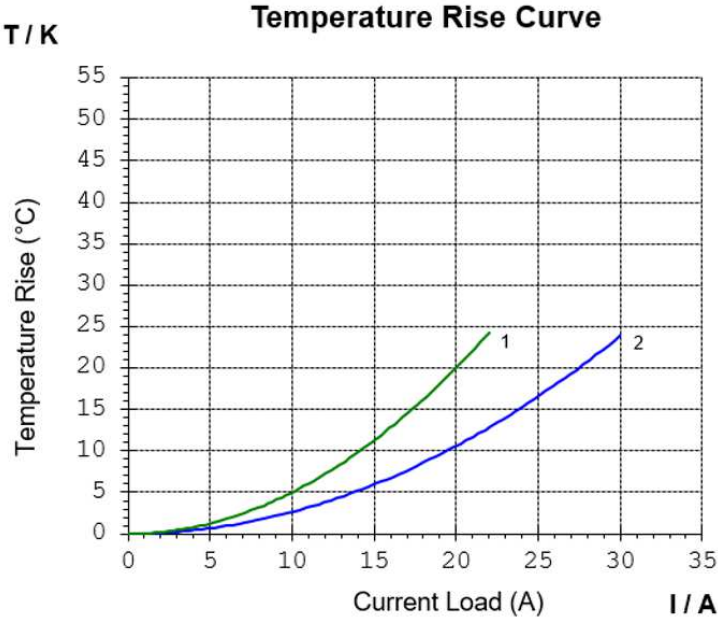
i **NOTE**
T-rise curves indicate testing at 20% above rated current.



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



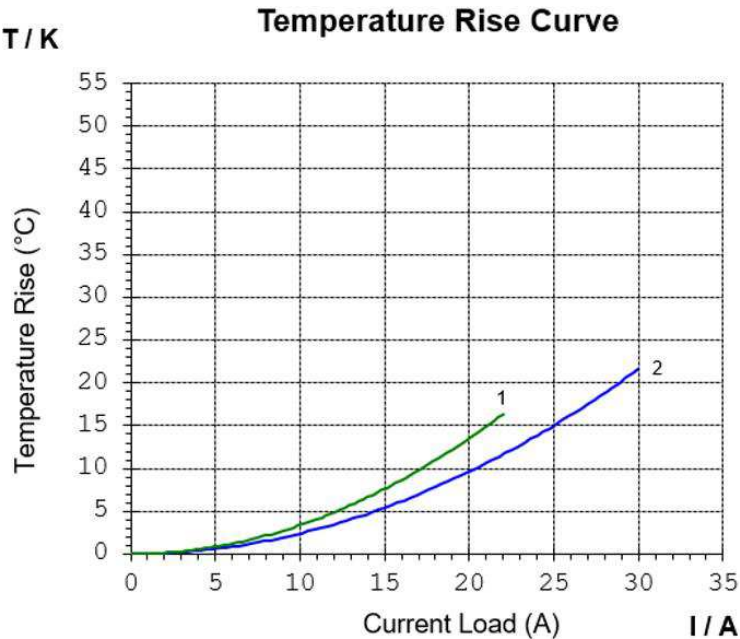
NOTE
T-rise curves indicate testing at 20% above rated current.



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



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



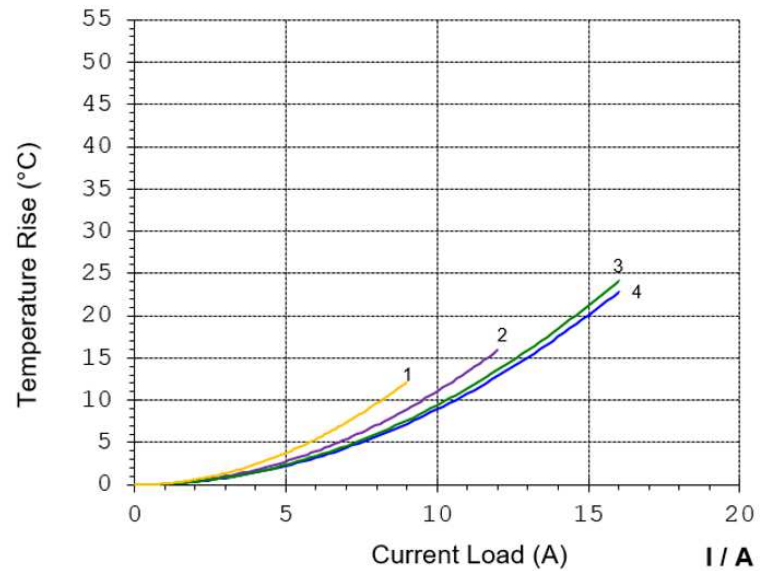
Size 16 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-202-16141	0462-201-16141	20 AWG	1
		18 AWG	2
		16 AWG	3
0460-215-16141	0462-209-16141	14 AWG	4



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

T / K

Temperature Rise Curve



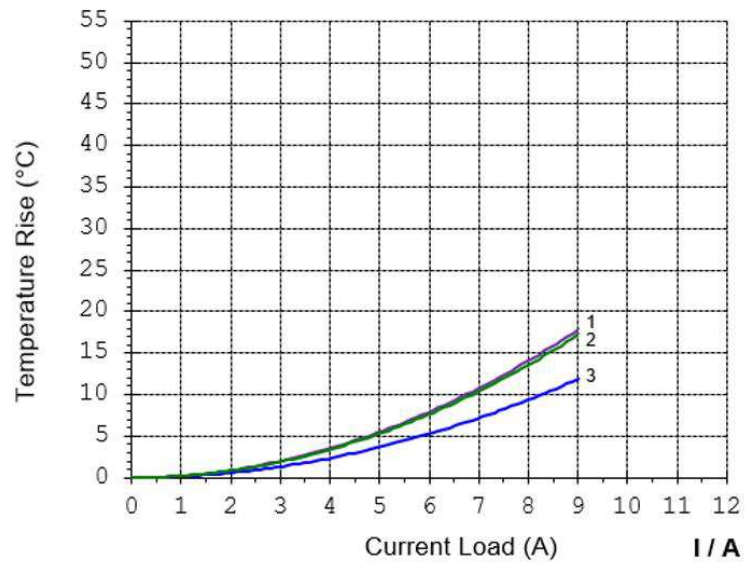
Size 20 - Nickel			
Pin Part Number	Soc Part Number	Wire	Curve
0460-202-20141	0462-201-20141	20 AWG	1
0460-010-20141	0462-005-20141	18 AWG	2
		16 AWG	3



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

T / K

Temperature Rise Curve



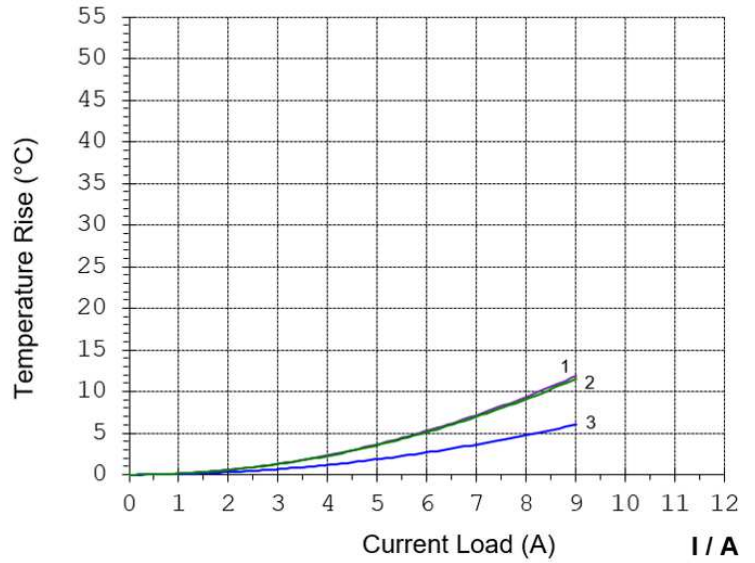
Size 20 - Gold			
Pin Part Number	Soc Part Number	Wire	Curve
0460-202-2031	0462-201-2031	20 AWG	1
0460-010-2031	0462-005-2031	18 AWG	2
		16 AWG	3



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

T / K

Temperature Rise Curve



4.1. Revision History

Rev Ltr	Brief Description of Change	Date	Dwn	Apvd
A	Initial Release	28-Aug-2020	DM	IG