



TEST REPORT

PRODUCT ENGINEERING LABORATORY	RL. 130209	Revision: 1
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Material / Parts description: MINI-MIC TAB CONTACT MINI-MIC TAB CONTACT MINI-MIC TAB CONTACT	PN: 282109-1 282477-1 282440-1	Revision: E B A
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Requester: MÁRCIO MIRANDA	Dept: EPA
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Customer: DIVERSOS	Supplier: TE BRAZIL
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Confidentiality:	Distribution:
() 1- CONFIDENTIAL () 2- TYCO RESTRICTED (X) 3- ADDRESSED CUSTOMER	(X) REQUESTER (X) DM.TEC ()

Purpose: 1 - VALIDATION TEST	History: VALIDATION TEST FOR CUSTOMER SUMIDENSO (FINAL CUSTOMER HONDA).
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Performed tests: -VOLTAGE DROP; -CONTACT RESISTANCE; -CONNECTOR MATING /UNMATING FORCE; -SINGLE CONTACT ENGAGING/DISENGAGING FORCE; -INSERTION/RETENTION FORCE OF THE SINGLE CONTACT IN THE HOUSING; -CRIMPING TENSILE STRENGTH; -CRIMPING ANALYSIS.	Specification (s): TE 108-20090. TE 108-37024.
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Conclusion:

SEE RESULTS FOR INDIVIDUAL TESTS.

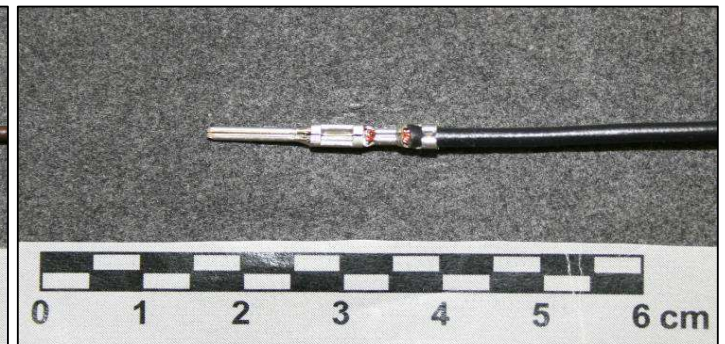
Nov 12, 2012
Date

***Signature on file**
Performed by
DIOGO BIASETTO ROJAS
LABORATORY ENGINEER

***Signature on file**
Responsible
ROBERTO DE OLIVEIRA
PRINCIPAL AND LABORATORY MANAGER

I- SAMPLES IDENTIFICATION:

150 parts Mini-Mic TAB terminal PN 282109-1, crimped with 0,75mm² wire gauge;
150 parts Mini-Mic TAB terminal PN 282109-1, crimped with 1,5mm² wire gauge;
150 parts Mini-Mic TAB terminal PN 282440-1, crimped with 0,5mm² wire gauge;
150 parts Mini-Mic TAB terminal PN 282440-1, crimped with 1,0mm² wire gauge;
150 parts Mini-Mic TAB terminal PN 282477-1, crimped with 1,0mm² wire gauge;
150 parts Mini-Mic TAB terminal PN 282477-1, crimped with 1,5mm² wire gauge;
150 parts Mini-Mic REC terminal PN 282110-1, crimped with 0,75mm² wire gauge;
150 parts Mini-Mic REC terminal PN 282110-1, crimped with 1,5mm² wire gauge;
150 parts Mini-Mic REC terminal PN 282439-1, crimped with 1,0mm² wire gauge;
150 parts Mini-Mic REC terminal PN 282439-1, crimped with 0,5mm² wire gauge;
30 parts AMP SUPERSEAL 1.5 SRS. 2 POSITIONS PLUG ASS'Y, PN 282080-1.
30 parts AMP SUPERSEAL 1.5 SRS. 2 POSITIONS TAB ASS'Y, PN 282104-1.
15 parts HOUSING DOOR'S OFF ASSY 20P MULTILOCK TAB, PN 881643-3.
15 parts HOUSING ASSY 20 POSN. MULTILOCK REC., PN 881637-3.

Terminal TAB PN: 282109-1:**Photo 1 - 1,5mm² wire cable****Photo 2 - 0,75mm² wire cable****Terminal TAB - PN 282440-1:****Photo 3 - 0,5mm² wire cable****Photo 4 - 1,0mm² wire cable**

Terminal TAB - PN 282477-1:



Photo 5 - 1,0mm² wire cable



Photo 6 - 1,5mm² wire cable

Terminal REC - PN 282110-1:



Photo 7 - 0,75mm² wire cable



Photo 8 - 1,5mm² wire cable

Terminal REC - PN 282439-1:



Photo 9 - 0,5mm² wire cable

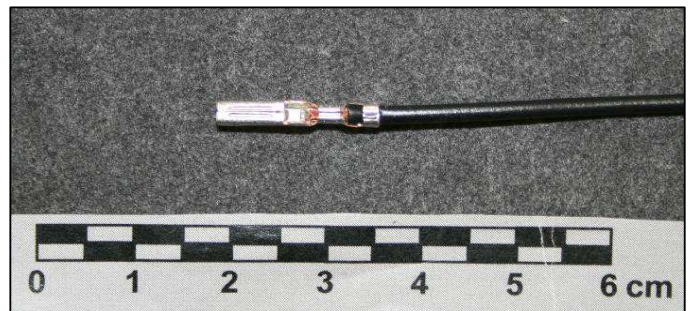


Photo 10 - 1,0mm² wire cable



Photo 11 - AMP SUPERSEAL 1.5 SRS. 2 POSITIONS PLUG ASS'Y, PN 282080-1



Photo 12 - AMP SUPERSEAL 1.5 SRS. 2 POSITIONS TAB ASSY, PN 282104-1



Photo 13 - 2 POSITIONS MOUNTED CONNECTOR



Photo 14 - HOUSING DOOR'S OFF ASSY 20POSN MULTILOCK REC PN 881637-3 AND TAB PN 881643-3, RESPECTIVELY

Results:

1 - Voltage drop:

Specification:

108-20090 item 3.1.

Equipments:

Power supply PAK 20-36A.

Digital Multimeter Agilent model: 34401A, nr. 93-339033-024.

Digital Multimeter HP model: 34401A, nr. 93-339033-031.

Procedure:

Measure the voltage drop from point A to point B and subtract the voltage drop of 150mm of cable (please see photo below).

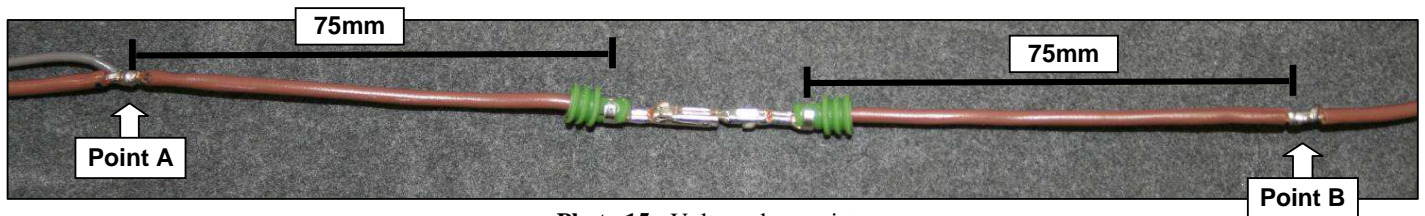


Photo 15 - Voltage drop points

Test current:

0,5mm²: 6Adc.

0,75mm²: 8,5Adc.

1,0mm²: 11Adc.

1,5mm²: 14Adc.

Requirements:

Initial voltage drop \leq 3mV/A.

Results:

Samples	Voltage drop [mV/A]
	PN: 282109 1,5mm ²
1	1,35
2	1,28
3	1,31
4	1,19
5	1,20
6	1,32
7	1,41
8	1,40
9	1,20
10	1,38

Samples	Voltage drop [mV/A]
	PN: 282109 0,75mm ²
11	1,34
12	1,31
13	1,11
14	1,31
15	1,29
16	1,29
17	1,31
18	1,26
19	1,23
20	1,12

Samples	Voltage drop [mV/A]
	PN: 282440 0,5mm ²
21	1,42
22	1,53
23	1,43
24	1,68
25	1,48
26	1,22
27	1,42
28	1,25
29	1,55
30	1,57

Samples	Voltage drop [mV/A]
	PN: 282440 0,75mm
31	1,53
32	1,55
33	1,65
34	1,52
35	1,55
36	1,62
37	1,57
38	1,46
39	1,55
40	1,53

Samples	Voltage drop [mV/A]
	PN: 282477 1,0mm
41	1,62
42	1,74
43	1,42
44	1,58
45	1,68
46	1,48
47	1,52
48	1,57
49	1,41
50	1,93

Samples	Voltage drop [mV/A]
	PN: 282477 1,5mm
51	1,22
52	1,18
53	1,41
54	1,12
55	1,31
56	1,29
57	1,12
58	1,46
59	1,36
60	1,27

Conclusion:

Pass.

2 - Contact Resistance:

Specification:

108-20090 item 3.2.

Equipments:

Power supply Agilent E3641A, nr. 93-339036-019.

Digital Multimeter Agilent model: 34401A, nr. 93-339033-024.

Digital Multimeter HP model: 34401A, nr. 93-339033-031.

Procedure:

Measure the voltage drop from point A to point B and subtract the voltage drop of 150mm of cable.

Test current: 10mA.

Requirements:

Initial contact resistance $\leq 3\text{m}\Omega$.

Results:

Samples	Contact resistance [mΩ]
	PN: 282109 1,5mm ²
1	1,56
2	1,46
3	1,36
4	1,28
5	1,36
6	1,43
7	1,68
8	1,46
9	1,43
10	1,56

Samples	Contact resistance [mΩ]
	PN: 282109 0,75mm ²
11	1,47
12	1,50
13	1,07
14	1,45
15	1,44
16	1,40
17	1,50
18	1,36
19	1,30
20	1,32

Samples	Contact resistance [mΩ]
	PN: 282440 0,5mm ²
21	1,30
22	1,18
23	1,22
24	1,40
25	1,12
26	0,96
27	1,13
28	0,76
29	1,30
30	1,22

Samples	Contact resistance [mΩ]
	PN: 282440 0,75mm
31	1,96
32	1,81
33	2,16
34	1,86
35	1,94
36	2,41
37	1,86
38	1,66
39	2,06
40	1,81

Samples	Contact resistance [mΩ]
	PN: 282477 1,0mm
41	1,80
42	1,94
43	1,62
44	1,90
45	2,21
46	1,76
47	1,71
48	1,86
49	1,56
50	2,60

Samples	Contact resistance [mΩ]
	PN: 282477 1,5mm
51	1,34
52	1,31
53	1,48
54	1,24
55	1,48
56	1,39
57	1,25
58	1,34
59	1,42
60	1,53

Conclusion:

Pass.

3 - Connector mating/unmating force:

Specification:

108-20090 item 3.5 and 3.6.
108-37024 item 3.5.

Equipments:

Universal tensile strength machine WOLPERT 5TZZ, ref. Tyco 92-339017-025.
Digital Dynamometer Mecmesin, model MFG 500, ref. Tyco 92-339017-031.

Procedure:

Measure the connector housing mating and unmating force, manually.

Requirements:

Connector 2 positions with terminal TAB PN: 282109-1:

Mating force $\leq 120\text{N}$.

Unmating force:

A: Without operate the locking lance. (Unmating force $\leq 120\text{N}$).

B: Operating the locking lance. (Unmating force $\geq 145\text{N}$).

Connector 20 positions PN 881643-3:

Mating torque: 1,1Nm minimum.

Note: Unmating force is not applied for this connector. It was made just for information.

Results:

Connector 2 positions with terminal TAB PN: 282109-1:

Samples	Mating force [N]	Unmating force [N]	
		A	B
251	66,7	18,2	324
252	61,4	14,3	331
253	60,6	18,4	344
254	59,6	17,6	326
255	62,3	16,5	338

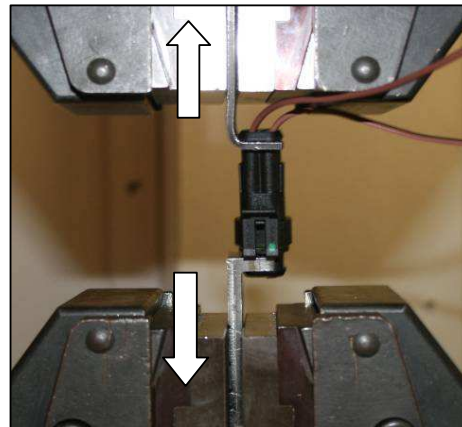


Photo 16 - Unmating force test

Connector 20 positions PN 881643-3:

Samples	Mating torque [Nm]	*Unmating force [N]
256 (TAB PN: 282477-1)	2,1	91,5
257 (TAB PN: 282477-1)	2,5	92,0
258 (TAB PN: 282440-1)	2,7	86,3
259 (TAB PN: 282440-1)	3,0	88,6

* This force refers to remove the terminal holder section of the female connector from the male connector. The locking ring was previously disassembled.



Photo 17 - Locking ring disassembled

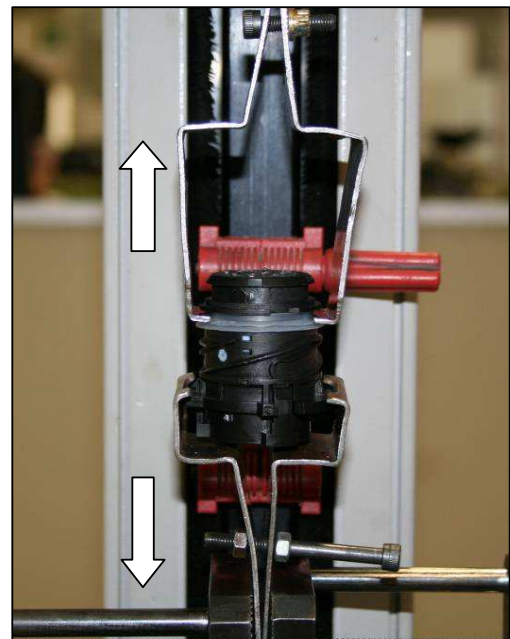


Photo 18 - Unmating force

Conclusion:

Pass.

4 - Single contact engaging/disengaging force:

Specification:

108-20090 item 3.7 and 3.8.

Equipments:

Digital Dynamometer IMADA, model DPS-11R NR. 92-339017-076.

Procedure:

Measure the mating and unmating force from terminal TAB to REC, manually.

Requirements:

Engaging force $\leq 8N$.

Disengaging force $\geq 2,5N$.

Results:

Connector 2 positions with terminal TAB PN: 282109-1:

Samples	Engaging [N]	Disengaging [N]
61	7,00	4,66
62	7,74	4,12
63	7,68	5,22
64	6,00	4,52
65	5,53	3,45
66	7,40	4,04
67	7,21	4,73
68	6,26	5,55
69	6,91	3,23
70	6,54	4,25

Connector 20 positions PN 881643-3.:

Terminal TAB - PN 282440-1:

Samples	Engaging [N]	Disengaging [N]
71	7,63	6,57
72	6,60	4,97
73	6,39	5,83
74	6,38	5,96
75	6,26	4,88
76	6,55	5,07
77	7,87	5,73
78	6,24	4,26
79	6,62	3,77
80	6,49	4,61

Terminal TAB - PN 282477-1:

Samples	Engaging [N]	Disengaging [N]
81	6,44	3,78
82	6,84	4,48
83	5,19	3,93
84	6,76	4,57
85	5,75	4,85
86	7,15	6,47
87	6,45	3,77
88	7,03	6,03
89	5,98	6,02
90	6,53	3,73

Conclusion:

Pass.

5 - Contact insertion/retention force of the single contact in the housing:

Specification:

108-37024 item 4;
108-20090 item 3.9.

Equipments:

Digital Dynamometer Mecmesin, model AFG 2500N, ref. Tyco 92-339017-032.
Digital Dynamometer IMADA, model DPS-11R NR. 92-339017-076.

Procedure:

Measure the mating and unmating force from terminal to housing, manually.

Requirements:

Insertion force $\leq 23\text{N}$.
Retention force $\geq 70\text{N}$.

Results:

Connector 2 positions with terminal TAB PN: 282109-1:

Tested five two ways connectors per wire gauge. Each sample below refer to a single way testing.

1,5mm² wire cable:

0,75mm² wire cable:

Samples	Insertion force [N]	Retention force [N]
91	11,28	86,80
92	15,66	89,80
93	12,78	93,60
94	15,47	94,10
95	12,85	93,20
96	15,08	89,20
97	12,40	93,20
98	12,51	90,70
99	12,62	84,80
100	12,75	92,70

Samples	Insertion force [N]	Retention force [N]
101	9,04	92,70
102	8,72	97,10
103	8,89	92,70
104	8,14	91,80
105	10,64	92,20
106	8,82	89,30
107	7,76	87,30
108	8,86	90,20
109	8,79	98,10
110	9,13	98,30

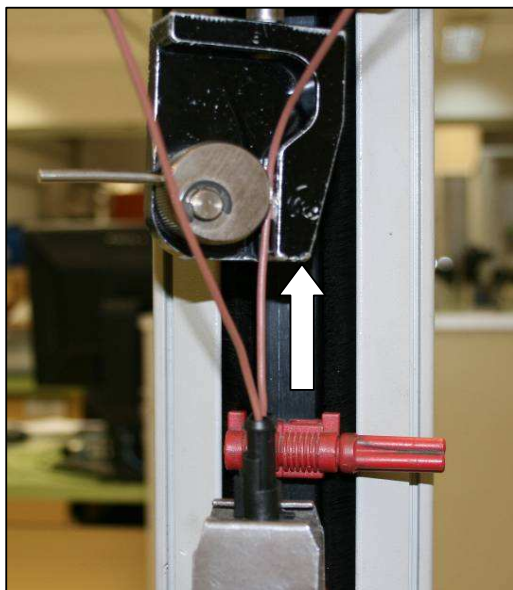


Photo 18 - Retention force

Connector 20 positions PN 881643-3.:

Terminal TAB - PN 282440-1:

Tested one twenty way connector per wire gauge. Each sample below refer to a simple way testing.

0,5mm² wire cable:

1,0mm² wire cable:

Samples	Insertion force [N]	Retention force [N]
111	6,23	118,20
112	4,71	95,10
113	6,57	97,60
114	5,87	94,60
115	5,73	94,10
116	6,38	99,50
117	4,92	99,00
118	7,48	96,60
119	6,13	103,50
120	4,74	98,10
121	5,57	103,90
122	7,50	102,50
123	5,37	98,10
124	7,77	97,60
125	4,91	99,00
126	7,40	100,10
127	5,16	92,80
128	6,82	98,10
129	6,32	101,00
130	6,43	102,50

Samples	Insertion force [N]	Retention force [N]
151	6,14	100,00
152	6,19	99,50
153	5,58	95,60
154	7,18	99,00
155	5,47	95,60
156	7,14	97,10
157	9,02	99,50
158	4,91	99,60
159	10,97	101,00
160	4,93	94,60
161	7,21	98,60
162	6,02	107,40
163	14,70	109,30
164	6,67	100,50
165	5,51	105,40
166	5,47	101,00
167	5,55	103,00
168	11,50	99,50
169	6,37	105,90
170	9,27	103,50

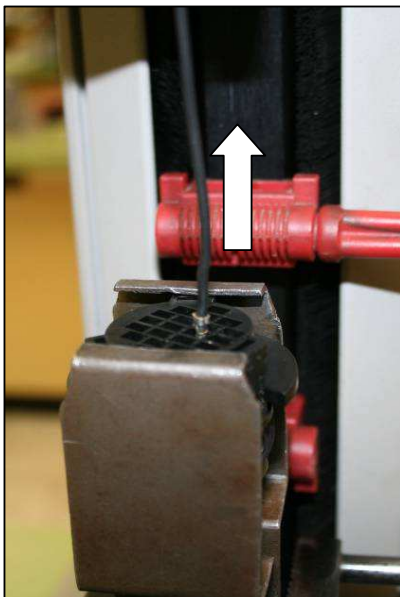


Photo 19 - Retention force

Connector 20 positions PN 881643-1:

Terminal TAB - PN 282477-1:

1,5mm² wire cable:

Samples	Insertion force [N]	Retention force [N]
131	5,57	106,90
132	7,04	108,80
133	7,37	105,90
134	7,60	102,50
135	7,50	107,30
136	7,69	106,90
137	7,00	117,70
138	7,24	115,60
139	10,13	116,40
140	9,60	110,30
141	4,97	114,30
142	8,16	124,50
143	5,92	112,40
144	5,34	111,30
145	5,63	105,20
146	5,50	104,40
147	5,45	104,60
148	14,95	117,20
149	8,45	113,80
150	7,41	105,10

1,0mm² wire cable:

Samples	Insertion force [N]	Retention force [N]
171	4,55	121,10
172	6,14	122,60
173	5,33	120,10
174	8,58	115,70
175	5,68	119,60
176	13,24	124,50
177	9,97	127,00
178	7,30	120,10
179	12,59	140,70
180	13,54	131,40
181	7,58	125,50
182	15,22	129,50
183	8,26	124,50
184	8,07	114,10
185	6,27	122,30
186	11,31	116,20
187	6,14	119,80
188	5,70	100,50
189	11,16	126,00
190	13,09	113,80

Conclusion:

Pass.

6 - Crimping tensile strength:

Specification:

108-20090 item 3.10.

Equipments:

Digital Dynamometer Mecmesin, model AFG 2500N, ref. Tyco 92-339017-032.

Procedure:

Apply force until terminal/conductor separation occurs at a speed of 50mm/min.

Requirements:

0,5mm²: >70N.

0,75mm²: >92,5N.

1,0mm²: >115N.

1,5mm²: >155N.

Results:

Terminal TAB PN: 282109-1:

1,5mm² wire cable:

Samples	Retention force [N]
191	184,4
192	219,8
193	231,8
194	238,1
195	231,0
196	209,4
197	241,3
198	249,1
199	191,8
200	149,9

0,75mm² wire cable:

Samples	Retention force [N]
201	157,9
202	150,1
203	159,9
204	152,0
205	137,0
206	151,0
207	153,0
208	161,8
209	148,1
210	145,2

Terminal TAB PN: 282440-1:

0,5mm² wire cable:

Samples	Retention force [N]
211	118,2
212	123,1
213	115,7
214	113,8
215	118,2
216	118,2
217	120,1
218	113,8
219	121,1
220	114,2

1,0mm² wire cable:

Samples	Retention force [N]
221	203,5
222	219,2
223	214,8
224	197,2
225	235,4
226	211,3
227	215,4
228	227,4
229	199,8
230	207,7

Terminal TAB PN: 282477-1:

1,0mm² wire cable:

Samples	Retention force [N]
231	180,5
232	188,3
233	220,1
234	193,4
235	184,6
236	192,2
237	168,2
238	195,3
239	184,9
240	210,4

1,5mm² wire cable:

Samples	Retention force [N]
241	272,2
242	270,1
243	259,4
244	299,3
245	239,8
246	255,0
247	281,4
248	267,3
249	272,1
250	249,4

Conclusion:

Pass.

7 - Crimping analysis:

Specification:

Informative.

Equipments:

Microscope STEMI 2000C, nr. TE 15112.

Procedure:

Verify cable attachment integrity and conformance to design requirements by cross sectioning and photographing the crimp area.

Requirements:

Informative only. Evaluation by the requester.

Terminal TAB PN: 282109-1:

1,5mm² wire cable:

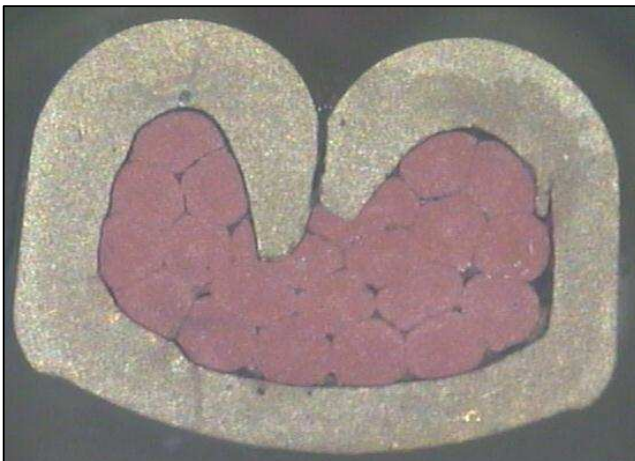


Photo 20 - Crimping analysis

0,75mm² wire cable:

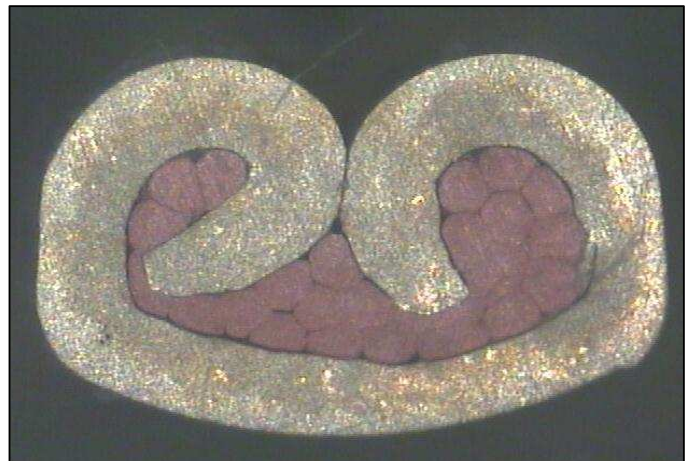


Photo 21 - Crimping analysis

Terminal TAB PN: 282440-1:

0,5mm² wire cable:

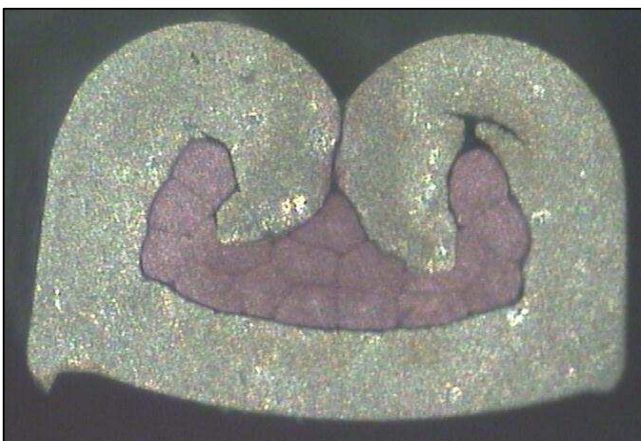


Photo 22 - Crimping analysis

1,0mm² wire cable:

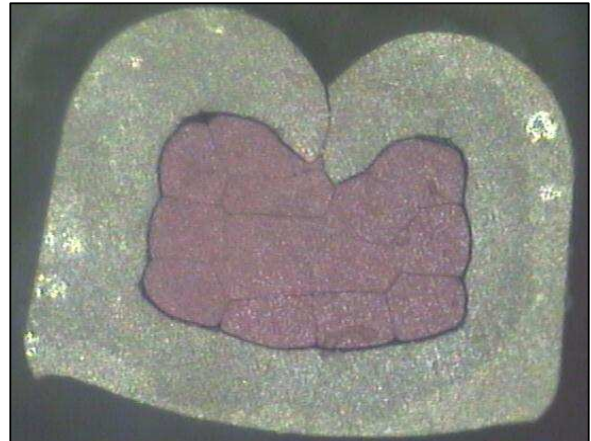


Photo 23 - Crimping analysis

Terminal TAB PN: 282477-1:

1,0mm² wire cable:

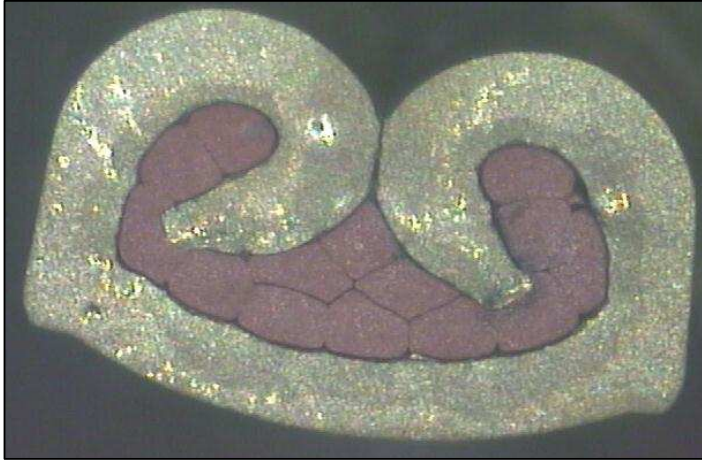


Photo 24 - Crimping analysis

1,5mm² wire cable:



Photo 25 - Crimping analysis