



TEST REPORT

PRODUCT ENGINEERING LABORATORY	RL. 130980	REVISION: 1
Material / Parts description: SUPERSEAL 1.5 SERIES 4P AMP SUPERSEAL 1.1 SERIES 4P CA MINI MIC TAB CONTACT MINI MIC REC CONTACT	PN: 282088-1 282106-1 282465-1 282466-1	REVISION: B B A A
Requester: GENTIL JR	Dept: EPA	
Customer: SEVERAL	Supplier: TE CONNECTIVITY	

Confidentiality:	Distribution:
<input type="checkbox"/> 1- CONFIDENTIAL <input type="checkbox"/> 2- TE RESTRICTED <input checked="" type="checkbox"/> 3- ADDRESSED CUSTOMER <input type="checkbox"/>	<input checked="" type="checkbox"/> REQUESTER <input checked="" type="checkbox"/> DMTEC <input type="checkbox"/> <input type="checkbox"/>

Purpose: 1 - NEW RAW MATERIAL	History: WAR ON MATERIAL PROJECT. VALIDATION TEST WITH PA6.6 15GF RAW MATERIAL (PN 2136267-1).
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Test(s) Made : ACCORDING TO TEST PLAN ATTACHED.	Specification (s): TE 108-20090 REVISION 2007.
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Conclusion:

Please see individual tests results.

<u>28/ago/13</u> Date	<u>*Signature on file</u> Executed by DIOGO BIASETTO ROJAS TEST ENGINEER	<u>*Signature on file</u> Responsible PAULO S. ALMEIDA LABORATORY COORDINATOR
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Accomplished tests according to Test Plan attached:

1.1 - Connector mating force (item 3.5)..... pg. 03
 1.2 - Connector unmating force (item 3.6)..... pg. 03
 1.3 - Retention force of the single contact in the housing (item 3.9)..... pg. 04
 1.4 - Thermal cycling (item 3.16)..... pg. 06
 1.5 - Ageing resistance (item 3.17)..... pg. 08
 1.6 - Chemical resistance (item 3.18)..... pg. 10

Samples Identification

48 parts of SUPERSEAL 1.5 SERIES 4P (REC) PN: 282088-1 WITH PA6.6 15GF RAW MATERIAL (PN 2136267-1).
 48 parts of AMP SUPERSEAL 1.5 SERIES 4P (TAB) PN: 282106-1.
 192 parts of MINI MIC TAB CONTACT PN: 282465-1.
 192 parts of MINI MIC REC CONTACT PN: 282466-1.



Photo 1 - MINI MIC CONTACT



Photo 2 - HSG SUPERSEAL TAB



Photo 3 - HSG SUPERSEAL REC

1.1 - Connector mating force (item 3.5):

Samples:

Samples number 21 to 31.

Equipment:

Imada Digital dynamometer, model DPS 11R, ref. TE 92-339017-076.

Procedure:

Measure mating force from terminal to housing manually.

Requirements:

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

Results:

Sample	Mating force [N]
21	88,7
22	91,5
23	107,0
24	95,5
25	103,5
26	103,0
27	99,0
28	95,0
29	99,5
30	91,5
31	100,0
Minimum	88,7
Average	97,7
Maximum	107,0

Conclusion:

All samples met the requirements.

1.2 - Connector unmating force (item 3.6):

Samples:

Samples number 21 to 31.

Equipment:

Universal tensile strength machine VERSATEST with digital dynamometer Mecmesin AFG 2500N, ref. TE 92-339017-090.

Procedure:

Measure unmating force from connector to counterpart, with a 50mm/min speed.

Requirements:

A) Unmating force (without operating the locking lance) $\geq 145\text{N}$ (samples 1 to 6).

B) Unmating force (operating the locking lance) $\leq 120\text{N}$ (samples 7 to 11).

Results:

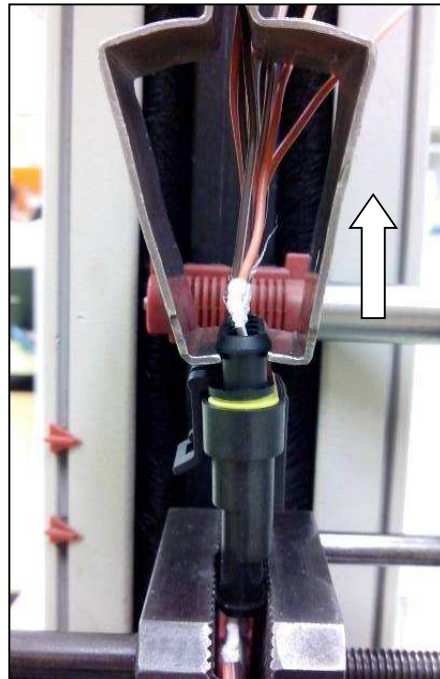


Photo 4 - Connector unmating force

Sample	Unmating force [N]	
	A	B
21	383,5	-
22	330,0	-
23	316,0	-
24	366,0	-
25	370,0	-
26	376,0	-
27	-	40,5
28	-	30,5
29	-	43,0
30	-	38,5
31	-	42,5
Minimum	316,0	30,5
Average	356,9	39,0
Maximum	383,5	43,0

Conclusion:

All samples met the requirements.

1.3 - Retention force of the single contact in the housing (item 3.9):

Samples:

Samples number 32 to 41.

Equipment:

Imada Digital dynamometer, model DPS 11R, ref. TE 92-339017-076.

Universal tensile strength machine VERSATEST with digital dynamometer Mecmesin AFG 2500N, ref. TE 92-339017-090.

Procedure:

Contact to housing insertion force at a rate of 50mm/min.

Contact to housing retention force at a rate of 50mm/min (informative).

Requirements:

Retention force $\geq 80\text{N}$.

Results:

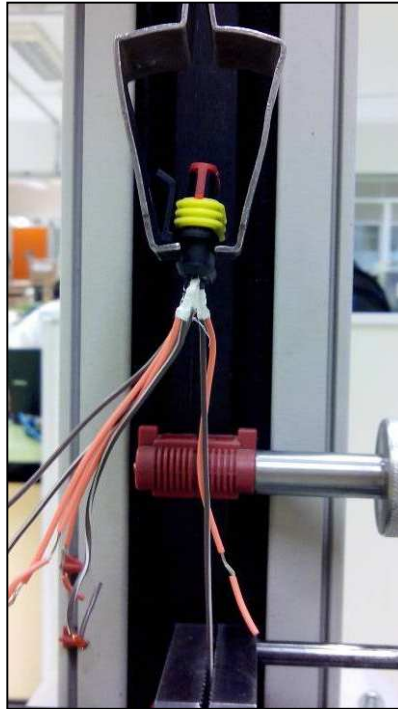


Photo 5 - Terminal retention force

Sample	Contact insertion force [N]			
	Way 1	Way 2	Way 3	Way 4
32	7,36	7,60	8,15	6,90
33	8,13	7,66	7,16	8,32
34	5,92	7,21	5,74	5,58
35	6,39	6,27	6,81	6,95
36	7,82	6,98	7,42	6,79
37	7,75	6,79	5,95	5,93
38	7,04	6,70	6,93	6,74
39	7,65	7,12	6,87	7,12
40	8,01	8,25	7,01	7,98
41	7,54	7,50	7,27	11,96
Minimum	5,92	6,27	5,74	5,58
Average	7,36	7,21	6,93	7,43
Maximum	8,13	8,25	8,15	11,96

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Sample	Retention force [N]			
	Way 1	Way 2	Way 3	Way 4
32	96,0	97,5	97,0	95,0
33	98,5	82,0	88,0	85,0
34	97,5	94,5	93,0	90,5
35	98,0	95,0	97,5	99,5
36	90,0	92,5	95,5	93,0
37	92,0	92,0	95,5	98,5
38	95,5	97,0	93,5	97,5
39	101,0	105,5	98,0	96,5
40	97,0	93,5	97,0	99,0
41	101,0	88,0	90,5	88,0
Minimum	90,0	82,0	88,0	85,0
Average	96,7	93,8	94,6	94,3
Maximum	101,0	105,5	98,0	99,5

Conclusion:

All samples met the requirements.

1.4 - Thermal cycling (item 3.16):

Samples:

Samples number 11 to 20.

Equipment:

Hypot ULTRA III Associated Research, Inc Serial number 9373007.

Universal tensile strength machine VERSATEST with digital dynamometer Mecmesin AFG 2500N, ref. TE 92-339017-090.

HP Digital Multimeter, model 34401A, ref. TE 93-339033-030.

PAK20-36A Power Supply, nr. 02703.

Procedure:

-Measure insulation resistance (500Vdc) and dielectric withstanding resistance (1500Vac) between adjacent terminals before and after thermal cycling;

-Perform voltage drop test before and after thermal cycling;

-Subject the samples to 14 cycles as described below:

16 hours at 40°C, 95% r.h.

2 hours at -40°C

2 hours at 125°C

4 hours at 23°C

-Perform 10 mating and unmating operations;

-In samples nr. 11 to 15 measure connector mating force before start the tests and connector unmating force after tests;

-In samples nr. 16 to 20 measure contact retention force from housing.

Specified:

No damages.

Insulation resistance $\geq 200M\Omega$.

Dielectric withstanding voltage: No breakdown or flashes.

Voltage drop $\leq 5mV/A$.

Connector mating force $\leq 120N$.

Connector unmating force $\geq 145N$.

Terminal retention force $\geq 80N$.

Results:

Insulation resistance: All samples presented values $> 50G\Omega$.

Dielectric withstanding: Samples didn't present breakdown or flashes.

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INITIAL MEASUREMENTS

Sample	Voltage drop [mV/A]			
	Way 1	Way 2	Way 3	Way 4
11	2,4	2,5	2,6	2,6
12	2,3	2,4	2,5	2,5
13	2,5	2,6	2,5	2,5
14	2,4	2,4	2,6	2,6
15	2,4	2,4	2,6	2,4
16	2,3	2,4	2,6	2,6
17	2,4	2,5	2,5	2,5
18	2,5	2,7	2,5	2,4
19	2,5	2,4	2,4	2,5
20	2,4	2,5	2,5	2,3
Minimum	2,3	2,4	2,4	2,3
Average	2,4	2,5	2,5	2,5
Maximum	2,5	2,7	2,6	2,6

AFTER CONDITIONING MEASUREMENTS

Sample	Voltage drop [mV/A]			
	Way 1	Way 2	Way 3	Way 4
11	4,9	3,7	4,6	4,2
12	4,0	3,8	4,3	3,9
13	3,8	4,1	4,2	4,9
14	3,4	4,0	4,5	4,6
15	4,6	4,9	4,5	4,5
16	4,2	3,5	4,9	4,0
17	3,8	3,3	3,9	4,8
18	4,9	4,0	4,4	4,2
19	4,1	4,7	3,5	5,0
20	4,9	3,6	4,0	3,6
Minimum	3,4	3,3	3,5	3,6
Average	4,3	3,9	4,3	4,4
Maximum	4,9	4,9	4,9	5,0

Sample	Connector mating force [N]	Connector unmating force [N]
11	97,5	471,5
12	98,6	466,5
13	105,2	495,0
14	101,2	499,0
15	100,0	496,0
Minimum	97,5	466,5
Average	100,5	485,6
Maximum	105,2	499,0

Sample	Contact retention force [N]			
	Way 1	Way 2	Way 3	Way 4
16	90,0	88,0	95,0	100,0
17	90,5	83,5	86,5	84,0
18	89,5	88,0	105,5	77,5
19	94,5	85,5	95,0	92,5
20	92,0	95,5	80,0	97,5
Minimum	89,5	83,5	80,0	77,5
Average	91,3	88,1	92,4	90,3
Maximum	94,5	95,5	105,5	100,0

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Conclusion:

All samples met the requirements.

1.5 - Ageing resistance (item 3.17):

Samples:

Samples number 1 to 10.

Equipment:

Hypot ULTRA III Associated Research, Inc Serial number 9373007.

Universal tensile strength machine VERSATEST with digital dynamometer Mecmesin AFG 2500N, ref. TE 92-339017-090.

HP Digital Multimeter, model 34401A, ref. TE 93-339033-030.

PAK20-36A Power Supply, nr. 02703.

Procedure:

- Measure insulation resistance (500Vdc) and dielectric withstanding voltage (1500Vac) between adjacent terminals before and after thermal cycling;
- Perform voltage drop test before and after thermal cycling;
- Subject the samples to 100 hours at 125°C;
- Perform 10 mating and unmating operations;
- In samples nr. 1 to 5 measure connector mating force before start the tests and connector unmating force after tests;
- In samples nr. 6 to 10 measure terminal retention force from housing.

Specified:

No damages.

Insulation resistance $\geq 200\text{M}\Omega$.

Dielectric withstanding voltage: No breakdown or flashes.

Voltage drop $\leq 5\text{mV/A}$.

Connector mating force $\leq 120\text{N}$.

Connector unmating force $\geq 145\text{N}$.

Terminal retention force $\geq 80\text{N}$.

Results:

Insulation resistance: All samples presented values $> 50\text{G}\Omega$.

Dielectric withstanding: Samples didn't present breakdown or flashes.

INITIAL MEASUREMENTS				
Sample	Voltage drop [mV/A]			
	Way 1	Way 2	Way 3	Way 4
1	2,5	2,5	2,6	2,7
2	2,5	2,5	2,7	2,5
3	2,6	2,3	2,6	2,4
4	2,4	2,5	2,4	2,5
5	2,3	2,3	2,5	2,4
6	2,4	2,4	2,6	2,5
7	2,4	2,6	2,4	2,6
8	2,5	2,4	2,6	2,5
9	2,5	2,3	2,7	2,5
10	2,2	2,5	2,2	2,4
Minimum	2,2	2,3	2,2	2,4
Average	2,4	2,4	2,5	2,5
Maximum	2,6	2,6	2,7	2,7

AFTER CONDITIONING MEASUREMENTS

Sample	Voltage drop [mV/A]			
	Way 1	Way 2	Way 3	Way 4
1	3,9	3,1	4,2	2,9
2	3,6	3,3	2,9	4,1
3	4,6	3,0	4,6	3,0
4	4,8	4,4	4,8	4,1
5	3,6	3,4	3,9	2,8
6	4,2	3,5	3,8	5,0
7	5,0	3,8	5,0	5,0
8	4,1	4,4	3,7	4,3
9	3,1	2,4	3,1	3,4
10	4,0	4,1	3,9	4,7
Minimum	3,1	2,4	2,9	2,8
Average	4,1	3,5	4,0	3,9
Maximum	5,0	4,4	5,0	5,0

Sample	Connector mating force [N]	Connector unmating force [N]
1	114,5	475,0
2	106,0	473,5
3	106,5	443,5
4	107,0	464,0
5	111,1	464,5
Minimum	106,0	443,5
Average	109,0	464,1
Maximum	114,5	475,0

Sample	Contact retention force [N]			
	Way 1	Way 2	Way 3	Way 4
6	92,0	84,5	90,5	86,0
7	88,0	107,5	95,0	87,5
8	85,5	81,5	87,5	88,0
9	101,5	104,5	103,5	111,0
10	77,5	91,0	78,5	91,0
Minimum	77,5	81,5	78,5	86,0
Average	88,9	93,8	91,0	92,7
Maximum	101,5	107,5	103,5	111,0

The bold values were under specified. Others values were approved.

Conclusion:

Terminal retention force value from samples nr. 10 were under specified. Other samples were approved.

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1.6 - Chemical resistance (item 3.18):

Samples:

Samples number 42 to 48.

Equipment:

Fanem 320E oven, nr. 92-339032-010.

Universal tensile strength machine VERSATEST with digital dynamometer Mecmesin AFG 2500N, ref. TE 92-339017-090.

Procedure:

Connectors must be immersed for 3 minutes in:

A-Brake fluid at 50°C (MOTORCRAFT FORD H1000S DOT4).

B-Anti-freeze fluid at 23°C (G012A8G VW).

C-Transmission oil at 100°C (TUTELA G1/A DEXRON II).

D-Engine oil at 100°C (TUTELA EPYX SAE 80W-90).

E-Gasoline at 23°C.

F-Diesel fuel at 23°C.

G-Window cleaner at 23°C (VIDREX VEJA).

-Measure contact retention force from housing.

Specified:

No damages, no leakages detected at visual examination.

Terminal retention force $\geq 80N$.

Results:

Sample	Contact retention force [N]			
	Way 1	Way 2	Way 3	Way 4
42	95,0	115,0	98,5	91,5
43	95,0	109,5	97,5	88,5
44	97,5	96,0	98,0	97,0
45	97,6	92,0	96,5	91,0
46	99,5	102,5	97,0	92,0
47	106,0	86,0	91,0	90,0
48	99,5	97,5	95,5	98,5
Minimum	95,0	86,0	91,0	88,5
Average	98,6	99,8	96,3	92,6
Maximum	106,0	115,0	98,5	98,5

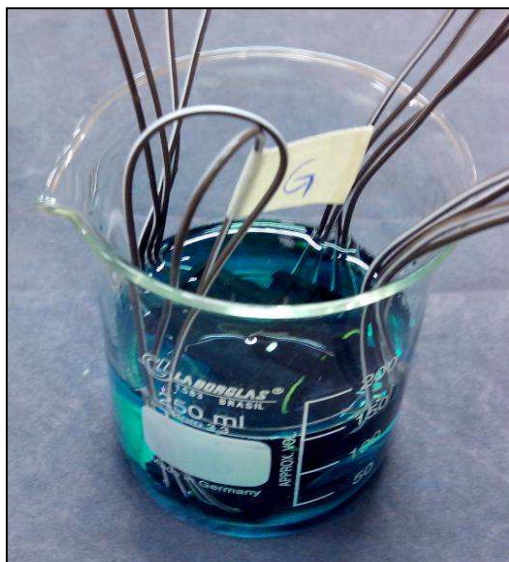


Photo 6 - Samples immersed



Photo 7 - Samples immersed



Photo 8 - Sample 42 after chemical resistance (A)



Photo 9 - Sample 43 after chemical resistance (B)



Photo 10 - Sample 44 after chemical resistance (C)



Photo 11 - Sample 45 after chemical resistance (D)



Photo 12 - Sample 46 after chemical resistance (E)



Photo 13 - Sample 47 after chemical resistance (F)



Photo 14 - Sample 48 after chemical resistance (G)

Conclusion:

No damages and leakages were detected. Samples approved.
All samples were approved.