Connector Products Inc.
Products for Power Utilities and Mass Transit
PO Box 2516 5 Surrey Lane Cinnaminson, NJ 08077
T (856) 829-9190 F (856) 829-9195
www.connectorproducts.com

April 7, 2009

Mr. Norris Nicholson, Chair
Technical Standards Committee "A" (Electric)
Rural Development Utilities Programs
1400 Independence Ave., S.W.
Stop 1569, Room 1246-S
Washington, DC 20250-1569

Dear Mr. Nicholson,

My company, Connector Products Inc., is seeking full acceptance by Rural Development Utilities Programs Technical Standards Committee "A" (Electric) for our Hot Line Tap Connector. After reviewing the items required for the application and general guidance, I have detailed the product below:

(a) Category/Subcategory: Hot Line Clamp (Item ap)/ Hot Line Connector (Item p)

(b) Product Description: Hot Line Tap Catalog numbers HTC 100-6, 100, 200, 200-4, 300

(c) Statement of Origin: "Hot Line Tap catalog numbers HTC 100-6, 100, 200, 200-4, 300 are manufactured in USA substantially all from articles, materials or supplies mined, produced or manufactured in USA."

(d) Manufacturing facility location: 5 Surrey Lane, Cinnaminson, NJ 08077

(e) Corporate mailing address: PO Box 2516 Cinnaminson, NJ 08077

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(f) Background information: Already on record.

(g) List of users: Progress Energy/Florida Power, Progress Energy/Carolina Power, Wright-Hennepin Electric Co-Op, City of Farmington (NM), CLECO (Central Louisiana Electric Company)

(h) Quality control/ Quality Assurance: ISO 9001-2000 Certified

Attachments: Drawings/Catalog Sheets, Test Data

Thank you very much for considering our product(s) for full acceptance.

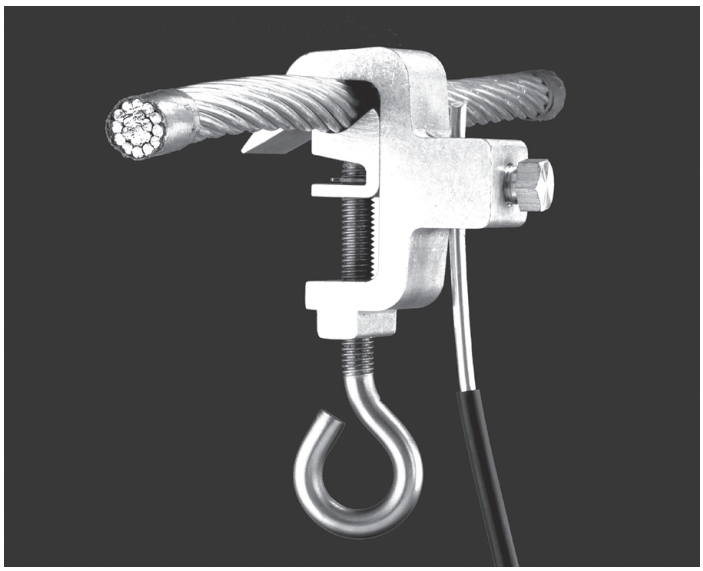
Sincerely,

Nick Polidori
Vice-President of Business Development
Connector Products Inc.
nickpolidori@connectorproducts.com

HTC Series
Hotline Tap Connector

"Better Products by Design"

MADE IN THE USA



CPI has become the first manufacturer to successfully integrate the industry accepted wedge-connecting principal into a hotline tap. Through utilization of the wedge principal, the HTC series tap maximizes interfacing force on the conductor and creates a self-maintaining spring wedge connection. This allows the connector to be installed directly to the line and ensures the ability of the HTC series tap to stay tight during service, by overcoming the loosening problems associated with heat cycling.

Features

Full-current rated connector.

High conductivity extruded aluminum construction.

Anti-Corrosion stainless steel drive screw for easy installation and removal.

Installable directly to the main line. No need for using a bail.

Self-maintaining spring-wedge connection.

May be used as permanent or temporary tap connection.

Able to accept a wide range of conductors with only three part numbers.

Cost-effective solution for any tap-off connection.

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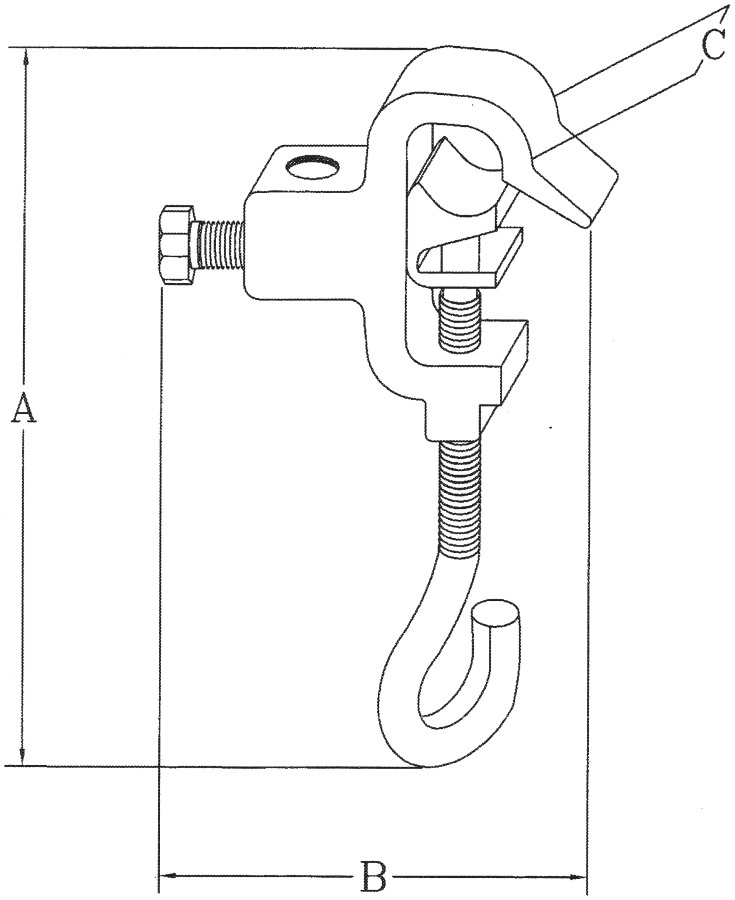
06/08

HTC Series Hotline Tap Connector Specifications



Product Specifications

Part Number	Main Range		Tap Range		Standard Package	
HTC 100-6	#6 CU - 4/0	.162"-.563"	#6 thru 1/0	0.100"-.398"	QTY	LBS
HTC 100	#6 ACSR - 4/0	.198"-563"	#6 thru 1/0	.100"-.398"	50	25
HTC 200	2/0 ACSR thru 556.5	.447"-.679	#6 thru 2/0	.100"-.447"	25	25
HTC 300	336.4 thru 954	.665"-1.125"	#6 thru 4/0	.100"-.583"	25	38

Materials	
Eye Bolt	303 Stainless Steel
"C" Body	6101 T6 ALU
Tap Screw	2024 T5 ALU
Interface	6101 T6 ALU

An increased conductive path between the main line and the tap line allows the connector to be full current rated. Benefits are a cost-effective one step process to create a temporary tap or a permanent connection. The HTC connector is equipped with a high strength stainless steel eyebolt to ensure easy installation or removal and features a high quality 6101 T6 aluminum alloy construction to provide strength and conductivity.

The HTC connector is a versatile product that can accept wires ranging from #4 thru 954, with only three different part numbers, making it a valuable component of any tap connection solution.

The connectors were tested using the CCT method (current cycle test) for class A temperature conditions as per ANSI C119.4 standard.

Model # HTC 300 was tested for 500 cycles at 1.5 hour cycle intervals.
Model # HTC 200 &100 were tested for 500 cycles at 1 hour cycle intervals.

2) Resistance Testing

ANSI C119.4 requires the resistance of the connection tested to be stable. Stability is achieved if any resistance measurement does not vary by more than ±5% from the average of all the measurements at specified intervals during the course of the test. Resistance measurements were made at the end of the current OFF periods with all connectors thermally stabilized at room ambient temperature. These measurements were made across each connector, between potential points located on the equalizers at the midpoint between the connectors. A low magnitude direct current less that 12A was used for these measurements. The resistance of each connector was then corrected from the measured temperature to 20ºC.

Resistance measurements were taken at the Connector Products test facility by the Burlington Electrical Testing Co. by using a Leeds and Northrop Kelvin bridge ohmmeter.

Results

1) Temperature Testing

Figure 1 shows the data recorded during the current cycling. The samples survived 500 cycles at 100ºC over ambient. Visual inspection and temperature readings both confirm that the samples were not significantly degraded by 500 cycle current cycling test. Temperature readings remained stable within 10ºC throughout the testing cycle.

2) Resistance Testing

Figure 2 shows actual and corrected resistance measurements recorded during the current cycling. The samples maintained stability between the 25^{th} cycle and 500^{th} cycle as per ANSI C119.4 requirements.

Conclusions

All samples exceed the ANSI C119.4 criteria for temperature and resistance stability.

Equipment Listing

1) Connector Products DC current power transformer
2) Westinghouse ammeter
3) Simpson 388 thermometer
4) Leeds and Northrop Kelvin bridge ohmmeter

References and Standards Listings

1) ANSI C119.4-2003

Temperature and Resistance Test for Hotline Tap Connectors

Summary

Three separate tests were performed to evaluate the Connector Products line of Hotline Tap Connectors. Testing was performed in accordance with ANSI C119.4-2003 to qualify tap connectors for temperature and resistance. The model HTC 100, HTC 200 and HTC 300 connectors evaluated comply with the acceptance criteria for temperature and resistance.

Samples

1) **Test #1**
   - A) Connector Products model HTC 300 tap connector (4 samples tested)
   - B) Hand coil, 556.5 AAC "Mistletoe" conductor, allowable ampacity 738 amps.
   - C) Hand coil 4/0 7 STR A,AA Copper conductor, allowable ampacity 444 amps.
2) **Test #2**
   - A) Connector Products model HTC 200 tap connector (4 samples tested)
   - B) Hand coil 4/0 AAC "Oxlip" conductor, allowable ampacity 383 amps.
3) **Test #3**
   - A) Connector Products model HTC 100 tap connector (4 samples tested)
   - B) Hand coil 1/0 AAC "Poppy" conductor, allowable ampacity 247 amps.

Procedure

1) Temperature Testing

ANSI C119.4 requires a class A (Heavy Duty) tap connector to maintain stability in temperature between the test connector and the control conductor. Stability is achieved if any temperature difference between the test connector and control conductor is not more than 10ºC below the average of all temperature differences in the interval. Also, temperature of the test connector is not to exceed the temperature of the control conductor.

Testing was performed at the Connector Products testing facility with measurements taken by Connector Products staff and independent electrical testing contractors. Connectors were installed to join four conductor sections and one control conductor section together to form a loop. One equalizer was installed between each connector for a total of six. A test transformer was used to raise the temperature 100ºC over ambient. Temperature measurements of the connectors, control conductor and ambient air were made at the end of the specified current ON cycle, immediately before the current is turned off. The temperature was recorded using thermocouples attached to each connector and the mid point of the control conductor.

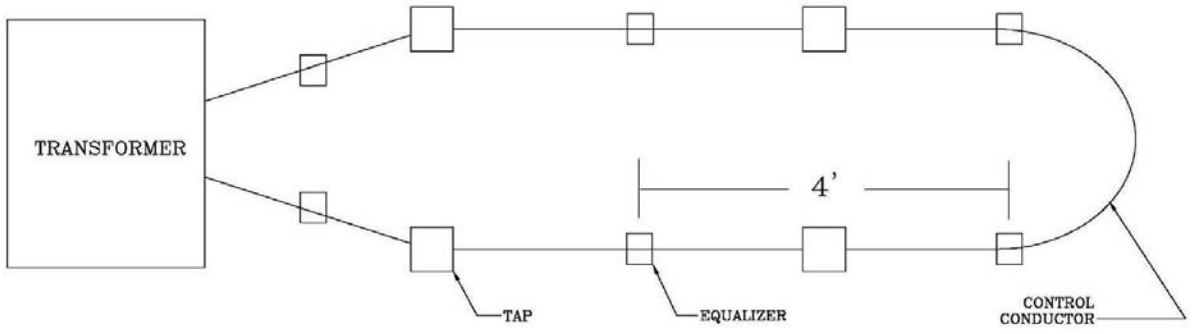


Figure 1.

Part #	HTC 100	Conductor Specimen	1/0 ASCR to 1/0 ACSR
Test Description	Current Cycle Temperature	Laboratory	Connector Products
Current	260 Amps	Date	Feb. 16 2001
Cycles	500	Units of Measure	Degrees Celsius
Cycle Intervals	1 Hour ON 1 Hour OFF		

TEMP. C	CYCLE	TEST CONDUCTOR		CONNECTOR #1		CONNECTOR #2		CONNECTOR #3		CONNECTOR #4		AVERAGE
		ºC	▲T	ºC	▲T	ºC	▲T	ºC	▲T	ºC	▲T	TEMP.
20	25	119	99	96	76	93	73	92	72	97	77	74.5
19	37	118	99	89	70	88	69	88	69	94	75	70.75
21	49	121	100	95	74	93	72	93	72	94	75	72.75
21	61	121	100	96	75	95	74	95	74	96	75	74.5
22	75	122	100	97	75	97	75	98	76	97	75	75.25
23	99	124	101	98	75	98	75	98	75	98	75	75
19	111	120	101	95	76	94	75	96	77	97	78	76.5
21	124	120	99	94	73	94	73	95	74	96	75	73.75
20	164	119	99	92	72	94	74	94	74	95	75	73.75
23	204	123	100	94	71	95	72	93	73	95	72	72
22	244	123	101	93	71	94	72	91	69	94	72	71
20	284	120	100	91	71	93	73	90	70	93	73	71.75
23	364	122	99	93	70	94	71	92	69	95	72	70.5
23	444	124	101	95	72	95	72	95	72	97	74	72.5
22	504	124	102	94	72	93	71	93	71	95	73	71.75
Average			100.07ºC									73.08ºC

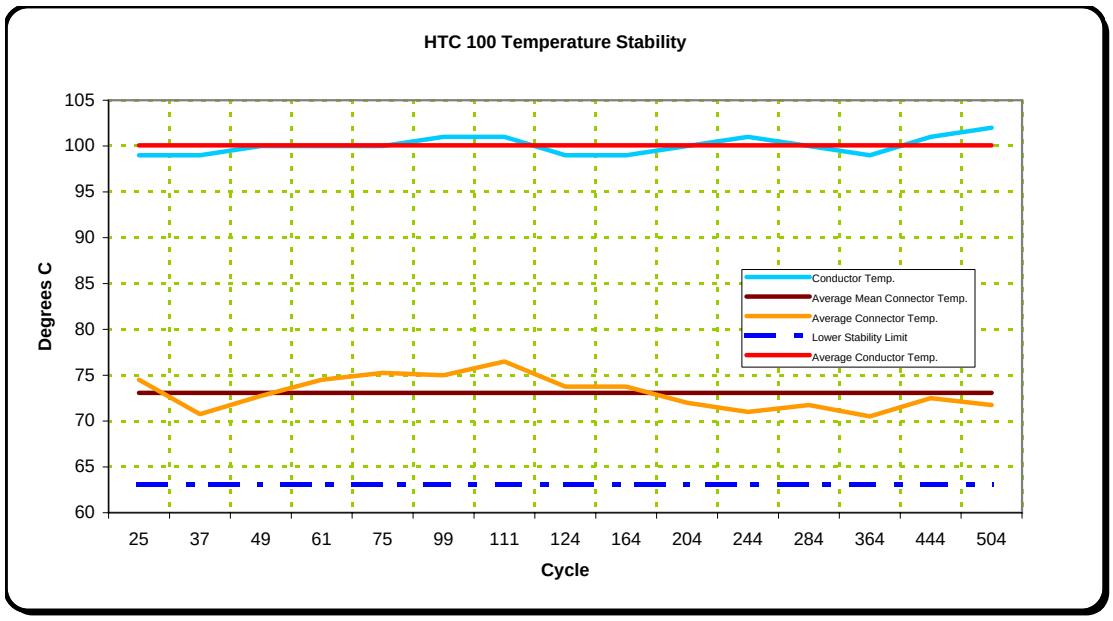
Part #	HTC 200	Conductor Specimen	4/0 AAC to 4/0 AAC
Test Description	Current Cycle Temperature	Laboratory	Connector Products
Current	480 Amps	Date	Sept. 8 2001
Cycles	500	Units of Measure	Degrees Celsius
Cycle Intervals	1 Hour ON 1 Hour OFF		

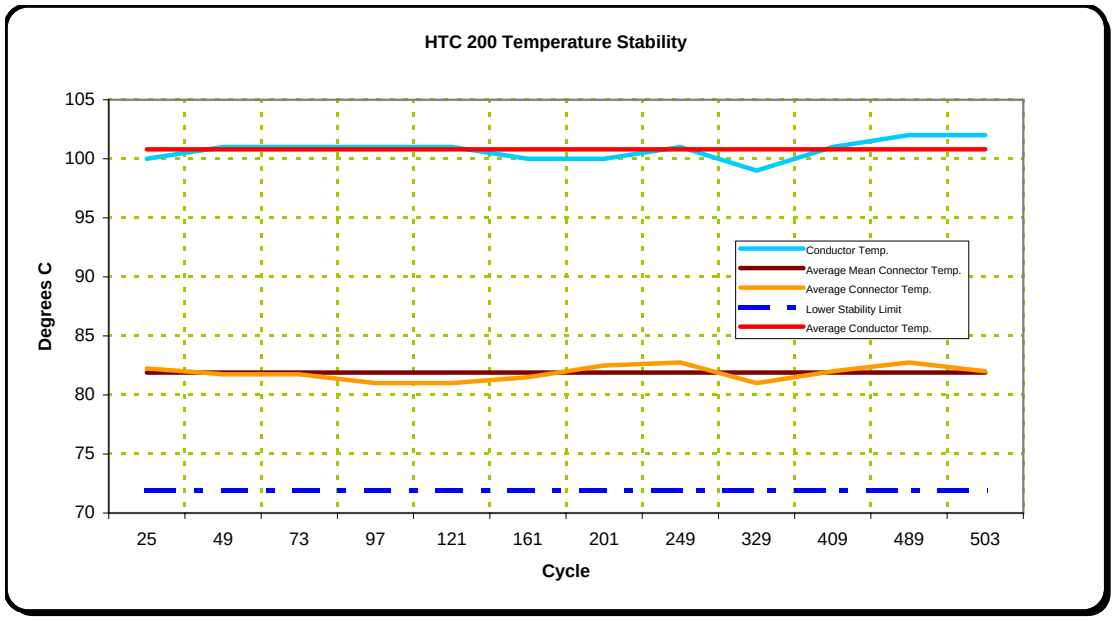
TEMP. C	CYCLE	TEST CONDUCTOR		CONNECTOR #1		CONNECTOR #2		CONNECTOR #3		CONNECTOR #4		AVERAGE
		ºC	▲T	ºC	▲T	ºC	▲T	ºC	▲T	ºC	▲T	TEMP.
17	25	117	100	98	81	98	81	101	84	100	83	82.25
19	49	120	101	99	80	100	81	103	84	103	82	81.75
21	73	122	101	101	80	102	81	104	83	104	83	81.75
20	97	121	101	100	80	100	80	103	83	101	81	81
21	121	122	101	101	80	102	81	102	81	103	82	81
23	161	123	100	104	81	104	81	105	82	105	82	81.5
23	201	123	100	105	82	105	82	106	83	106	83	82.5
22	249	123	101	104	82	104	82	106	84	105	83	82.75
23	329	122	99	103	80	104	81	105	82	104	81	81
24	409	125	101	105	81	106	82	107	83	106	82	82
24	489	126	102	106	82	107	83	107	83	107	83	82.75
23	503	125	102	104	81	105	82	106	83	105	82	82
Average			100.80ºC									81.90ºC

Part #	HTC 300	Conductor Specimen	556.5 AAC to 4/0 STR CU.
Test Description	Current Cycle Temperature	Laboratory	Connector Products
Current	560 Amps	Date	May 4 2002
Cycles	500	Units of Measure	Degrees Celsius
Cycle Intervals	1.5 Hours ON 1.5 Hours OFF		

TEMP. C	CYCLE	TEST CONDUCTOR		CONNECTOR #1		CONNECTOR #2		CONNECTOR #3		CONNECTOR #4		AVERAGE
		ºC	▲T	ºC	▲T	ºC	▲T	ºC	▲T	ºC	▲T	TEMP.
17	0	17	0	17	0	17	0	17	0	17	0	0
19	1	120	101	82	63	79	60	77	58	80	61	60.5
21	6	121	100	84	65	82	63	80	61	85	66	63.75
18	14	117	99	80	62	80	62	78	60	83	65	62.25
19	32	121	102	83	64	84	65	79	60	85	66	63.75
19	44	120	101	83	64	83	64	78	62	84	65	63.75
17	68	118	101	80	63	81	64	77	60	82	65	63
20	104	122	102	83	63	85	65	81	61	84	64	63.25
19	158	119	100	83	64	84	64	79	60	83	64	63
18	202	119	101	81	63	82	64	78	60	81	63	62.5
22	250	123	101	86	64	87	65	82	60	85	63	63
21	264	120	99	84	63	86	65	80	59	85	64	62.75
18	294	119	101	81	63	83	65	78	60	83	64	63
19	358	121	102	83	64	85	66	71	64	86	67	65.25
21	406	123	102	86	65	86	65	84	63	87	66	64.75
23	442	124	101	87	64	88	65	86	63	88	65	64.25
20	490	122	102	84	64	86	65	83	63	84	64	64
22	501	123	101	86	64	85	63	86	64	87	65	64
Average			100.94									63.34

Figure 1.


HTC 100 Temperature Stability
Degrees C
105
100
95
90
85
80
75
70
65
60
25 37 49 61 75 99 111 124 164 204 244 284 364 444 504
Cycle
Conductor Temp.
Average Mean Connector Temp.
Average Connector Temp.
Lower Stability Limit
Average Conductor Temp.


HTC 200 Temperature Stability
Degrees C
105
100
95
90
85
80
75
70
25 49 73 97 121 161 201 249 329 409 489 503
Cycle
Conductor Temp.
Average Mean Connector Temp.
Average Connector Temp.
Lower Stability Limit
Average Conductor Temp.

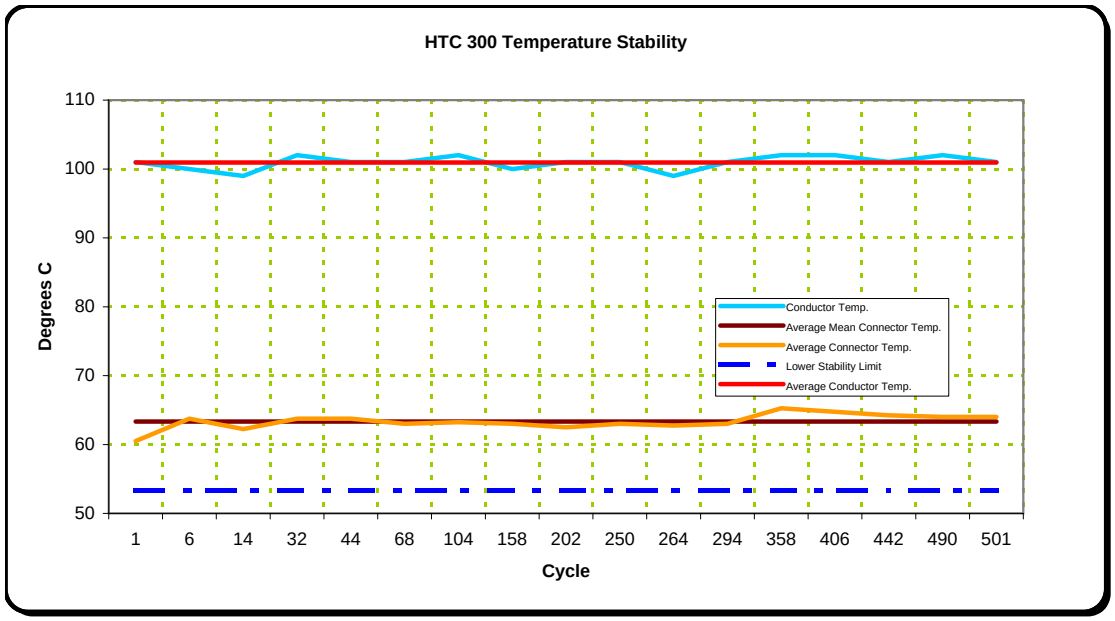

HTC 300 Temperature Stability
Degrees C
110
100
90
80
70
60
50
1 6 14 32 44 68 104 158 202 250 264 294 358 406 442 490 501
Cycle
Conductor Temp.
Average Mean Connector Temp.
Average Connector Temp.
Lower Stability Limit
Average Conductor Temp.

Figure 2.

Part #	HTC 100	Conductor Specimen	1/0 ASCR to 1/0 ACSR
Test Description	Current Cycle Resistance	Laboratory	Connector Products
Current	260 Amps	Date	Feb. 16 2001
Cycles	500	Units of Measure	Micro Ohms
Cycle Intervals	1 Hour ON 1 Hour OFF		

TEMP. C	CYCLE	TEST CONDUCTOR		CONNECTOR #1		CONNECTOR #2		CONNECTOR #3		CONNECTOR #4		AVERAGE
		AMB	20° C	AMB	20° C	AMB	20° C	AMB	20° C	AMB	20° C	RESIST.
20	0	310	310	332	332	337	337	337	337	340	340	336.5
20	25	316	316	336	336	342	342	344	344	346	346	342
21	49	318	315	338	335	343	340	346	343	348	345	340.75
22	75	320	314	340	334	345	339	348	342	350	344	339.75
23	99	322	313	343	334	346	337	350	341	352	343	338.75
21	124	319	316	337	334	342	339	346	343	349	346	340.5
20	164	317	317	336	336	343	343	345	345	343	347	342.75
23	204	323	313	342	336	346	340	351	345	352	346	339.25
22	244	321	316	342	336	346	340	351	345	352	346	341.75
20	284	318	318	337	337	343	343	346	346	345	345	342.75
23	364	324	315	343	334	347	338	350	341	352	343	339
23	444	325	316	345	336	351	342	353	344	355	346	341.75
22	504	322	313	344	335	350	342	352	343	354	345	341.25
Average			314.77									340.6

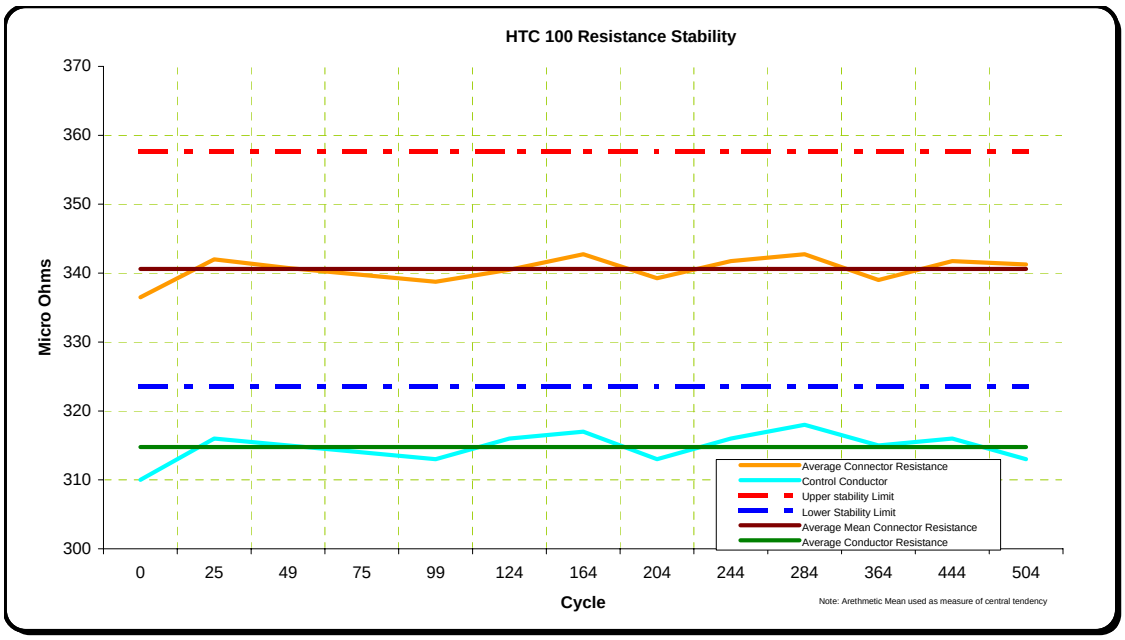
Part #	HTC 200	Conductor Specimen	4/0 AAC to 4/0 AAC
Test Description	Current Cycle Resistance	Laboratory	Connector Products
Current	480 Amps	Date	Sept. 8 2001
Cycles	500	Units of Measure	Micro Ohms
Cycle Intervals	1 Hour ON 1 Hour OFF		

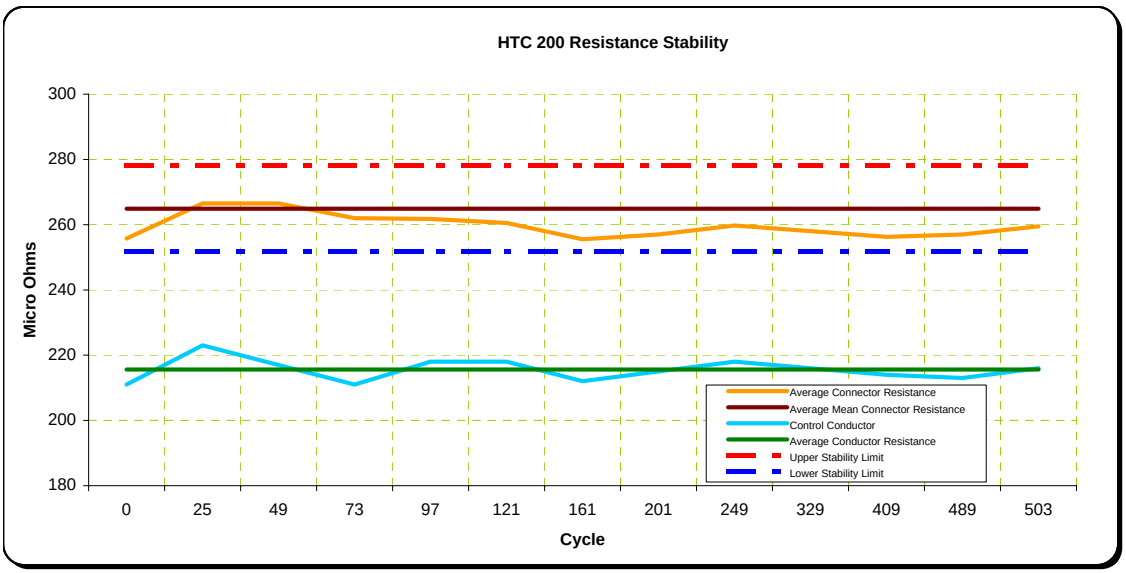
TEMP. C	CYCLE	TEST CONDUCTOR		CONNECTOR #1		CONNECTOR #2		CONNECTOR #3		CONNECTOR #4		AVERAGE
		AMB	20° C	AMB	20° C	AMB	20° C	AMB	20° C	AMB	20° C	RESIST.
20	0	211	211	253	253	254	254	258	258	258	258	255.75
17	25	214	223	261	270	255	264	256	265	259	267	266.5
19	49	213	217	258	261	258	261	256	259	261	264	266.5
21	73	214	211	263	260	261	258	259	256	263	260	262
20	97	218	218	263	263	261	261	259	259	264	264	261.75
21	121	221	218	263	260	263	260	262	259	266	263	260.5
23	161	221	212	266	257	265	256	263	254	266	255	255.5
23	201	224	215	267	258	265	256	265	256	268	259	257
22	249	224	218	265	259	266	260	265	259	267	261	259.75
23	329	225	216	269	259	267	258	266	257	267	258	258
24	409	226	214	270	258	268	256	266	254	269	257	256.25
24	489	225	213	270	258	268	256	268	256	270	258	257
23	503	225	216	269	260	268	259	268	259	269	260	259.5
Average			215.62									264.88

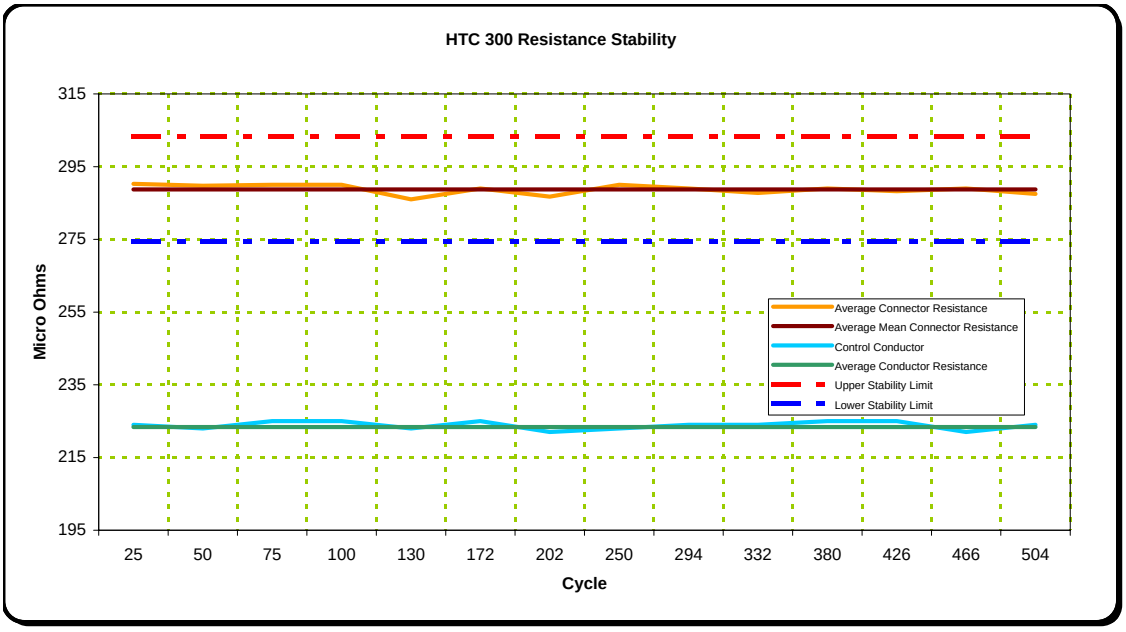
Part #	HTC 300	Conductor Specimen	556.5 AAC to 4/0 STR CU.
Test Description	Current Cycle Resistance	Laboratory	Connector Products
Current	560 Amps	Date	May 4 2002
Cycles	500	Units of Measure	Micro Ohms
Cycle Intervals	1.5 Hours ON 1.5 Hours OFF		

TEMP. C	CYCLE	TEST CONDUCTOR		CONNECTOR #1		CONNECTOR #2		CONNECTOR #3		CONNECTOR #4		AVERAGE
		AMB	20° C	AMB	20° C	AMB	20° C	AMB	20° C	AMB	20° C	RESIST.
19	25	221	224	281	284	281	284	296	294	297	297	290.25
20	50	223	223	283	283	284	284	295	294	294	294	289.75
20	75	225	225	285	285	286	286	295	294	294	294	290
20	100	225	225	282	282	287	287	295	296	296	296	290
21	130	226	223	284	281	287	284	290	292	289	289	286
19	172	222	225	282	285	281	284	294	289	293	293	289
21	202	225	222	286	283	282	281	292	294	291	291	286.75
22	250	229	223	294	288	291	285	292	297	291	291	290
20	294	224	224	285	285	286	286	295	294	294	294	289
21	332	227	224	288	285	288	285	288	296	293	293	287.75
20	380	225	225	284	284	286	286	294	292	292	292	289
21	426	228	225	288	285	287	284	293	294	291	291	288.25
23	466	231	222	295	286	293	284	292	303	294	294	289
22	504	230	224	290	284	289	283	291	298	292	292	287.5
Average			223.4		223.9		280.9		284.5		293	288.73

Figure 2.


HTC 100 Resistance Stability
Micro Ohms
370
360
350
340
330
320
310
300
0
25
49
75
99
124
164
204
244
284
364
444
504
Cycle
Average Connector Resistance
Control Conductor
Upper stability Limit
Lower Stability Limit
Average Mean Connector Resistance
Average Conductor Resistance
Note: Arethmetic Mean used as measure of central tendency


HTC 200 Resistance Stability
Micro Ohms
300
280
260
240
220
200
180
0
25
49
73
97
121
161
201
249
329
409
489
503
Cycle
Average Connector Resistance
Average Mean Connector Resistance
Control Conductor
Average Conductor Resistance
Upper Stability Limit
Lower Stability Limit


HTC 300 Resistance Stability
Micro Ohms
315
295
275
255
235
215
195
25
50
75
100
130
172
202
250
294
332
380
426
466
504
Cycle
Average Connector Resistance
Average Mean Connector Resistance
Control Conductor
Average Conductor Resistance
Upper Stability Limit
Lower Stability Limit