(1) All Wiggins Clamps

(8) Capacitance fluctuated & factors varied from M to F
(9) Negative Capacitance. Little or no resistance from F tube to fuel tube
(10) No 250 volts measurements taken. Anodization layer around O-ring may breakdown

7 March 97 — Temp 71.5 — RH: 23.9
5 March 97 — Temp: 72.3 — RH: 28.8

Speciman ID	Volume Resistance (Ohms) Beckman (A) Fluke (B)		Female to Male Resistance (Ohms)	Male Resistance To Fuel Tube (Ohms) with both T sections bonded		Female Resistance To Fuel Tube (Ohms) with both T Sections bonded		T/T Resistance Fuel Tube to Tube (Ohms)	Female Capacitance (nF) 1 khz, 1 VRMS with both T sections bonded		Male Capacitance (nF) 1 khz, 1 VRMS with both T sections bonded		M/F Safety Wire	Test Date
	10 Volt	250 Volt	Fluke 77	10 Volt (60 sec max)	250 Volt (10)	10 Volt (60 sec max)	250 Volt (10)	10 Volts (60 sec max wait)	Cap.	Q D G µS	Cap.	Q D G µS	Y/N	
Wiggins Comp. T9/T10 (5)	N/A	N/A	0.2	<50K (5)	see note (10)	<50K	see note (10)	4.5×10^9 (11)	1.08 (1)	Q 0 D F2 (4) G .3478 mS	1.08 (1)	Q 0 D F2 G .3487 mS	Y	5 Mar 97
Wiggins Comp. T1/T2	N/A	N/A	1.0	<50K	"	<50K	"	2.6×10^6 (11) (13)	-2.49 (1)	Q 0 (9) D F2 G [illegible]	-.145 (1) nF	Q 0 D 7.2 (9) G 6.585	Y	5 Mar 97
Wiggins Comp T5/T6 (9)	N/A	N/A	0.3 ohms	1.0×10^8	"	1.1×10^8	"	5×10^8 (Bond wire disconnected)	2.887 (1)	Q 4.3 D .2325 G 4.21	2.884 (1)	Q 4.3 D .2318 G 4.20	Y	5 Mar 97
Wiggins Comp. T7/T8 (6)	N/A	N/A	0.2	1.1×10^7	"	1.1×10^7	"	T/T ends bonded w/ bond wire	10.460 (1)	Q 5.0 D .1988 G 13.06	10.460 (1)	Q 5.0 D .1988 G 13.06	Y	5 Mar 97
Wiggins Comp (8) T11/T12	N/A	N/A	Short Circuit 0.0	7.0×10^7	"	1.0×10^8	"	5.0×10^8	3.609 (1)	Q [illegible] D .2953 G [illegible]	3.829 (1)	Q 5.8 D .1720 G 4.14	N	5 Mar 97
Wiggins Comp. T3/T4	N/A	N/A	Open Circuit w/ Fluke	1.4×10^7	"	9×10^6	"	3.8×10^8	.2627 (1) (only T3 ground)	Q 5.6 D .1800 G .298	3.396 (1)	Q 3.6 D .2775 G 5.92	Y (2)	5 Mar 97
									.6158 (1)	Q 9.2 D .1092 G .423	3.4 (3)			
CLAMP, TEFLON COATED DG26	N/A	N/A	N/A	>>1×10^12	>>1×10^12	N/A	N/A	Single Tube N/A	N/A	N/A	.0447 (1)	Q --- D --- G 0	N	4 Mar 97
CLAMP, ADEL RED/BLACK COATING TA4C44D28AF			N/A	1.3×10^7	<50K	N/A	N/A	Single Tube N/A	N/A	N/A	.7215 (1)	Q 11.6 D .0862 G .390 µS	N	5 Mar 97
CLAMP, ADEL WHITE RUBBER COATED WH29	(12) <<1.0×10^12	(12) <<1.0×10^12	N/A	>>1×10^12	>>1×10^12	N/A	N/A	Single Tube (24) N/A	N/A	N/A	.0325 (1)	Q --- D --- G .002	N	5 Mar 97
CLAMP, BLACK COATING DG32			N/A	6×10^5	<50K	N/A	N/A	Single Tube N/A	N/A	N/A	.5765 (1)	Q 2.9 D .3420 G 1.240	N	5 Mar 97

(11) Current must pass through both O-rings & anodized layers
(12) Clamp Alone, no fuel tube. Volume Resistance w/ ASTM F 150 electrode & base metal plate
(13) Resistance T2 to either M or F is <50K. T1 to M is 2×10^6. T1 to F is 2×10^6

Notes:
(1) Avg. Capacitance @1KHz
(2) Safety wire seems to influence M/F capacitance
(3) "Touching" contact produced similar C to contact through drilled hole & clamp
(4) mS vs. µS measurement (milliSiemens/microSiemens)
(5) Wiggins T9/T10 had punch through of anodized layer during 3 Mar 250 volt resistance test
(6) Bond clamps added for T7/T8

Speciman ID	Volume Resistance (Ohms) Beckman (A) Fluke (B)		Female to Male Resistance (Ohms)	Male Resistance To Fuel Tube (Ohms) with both T sections bonded		Female Resistance To Fuel Tube (Ohms) with both T sections bonded		T/T Resistance Fuel Tube to Tube (Ohms)	Female Capacitance (nF) 1 khz, 1 VRMS both T sections bonded		Male Capacitance (nF) 1 khz, 1 VRMS both T sections bonded		M/F Safety Wire	Test Date
	10 Volt	250 Volt	Fluke 77	10 Volt (60 sec wait)	250 Volt " (10)	10 Volt (60 sec wait)	250 Volt " (10)	10 Volts	Cap.	Q D G MS	Cap.	Q D G	Y/N	
Wiggins Coup. Dexters Purple M/F	N/A	N/A	0.7	6.0×10^{7}	"	6.0×10^{7}	"	< 50K	3.034 nF	Q 2.4 D .4115 G 7.85	3.040 nF	Q 2.4 D .4116 G 7.87	N	5 Mar
Wiggins Coup. T11/T12 after addition of Safety wire.	N/A	N/A	13.7	1.0×10^{8}	"	1.0×10^{8}	"	5.0×10^{8}	3.818	Q 5.6 D .1788 G 4.29	3.823	Q 5.6 D .1782 G 4.28	Y	5 Mar
~~Wrapping~~ Clamp, DG26 Teflon Coating ~~After Testing~~			N/A	$\gg 1\times10^{12}$	$\gg 1\times10^{12}$	N/A	N/A	Single Tube N/A	N/A	N/A	.0494	Q --- D --- G .001	N	5 Mar
Wiggins Coup T11/T12 (15) after addition (16)					"		"		3.580 (15)	Q 5.7 D .1754 G 3.93	3.582 (15)	Q 5.8 D .1714 G 3.83	Y	5 Mar
of feed through wire (not in test stand)			0.2 (16)	1.0×10^{8} (16)	"	1.0×10^{8} (16)	"	5.0×10^{8}	2.294 (16)	Q 4.0 D .2477 G 3.57	2.300 (16)	Q 4.0 D .2471 G 3.57	Y	5 Mar
T-Section Wiggins Coupling O-ring pressure					Loose Connection Initial Contact	$\approx 1.0\times10^{11}$ 2.5×10^{5}			>2950 .3431					5 Mar
Test.					Tightened	Short w/Beckman @ 10V Short w/Fluke			-.093					
Wiggins Coup. Dexters Imch Test Coupling Original O-rings			$\approx 4\times10^{10}$ (14)	$\approx 1.2\times10^{9}$ (14)	"	$\approx 3.5\times10^{10}$ (14)	"	$\approx 1.6\times10^{9}$ (14)	.1000	40.0 .025 .016	.1199	26.6 .037 .027	N	6 Mar
WIGGINS COUP DEXTERS, NEW 1" O-RINGS				1.5×10^{10}	"	1.3×10^{10}	"							6 Mar
WIGGINS COUP w/highest R O-rings for 7 Mar Test			8×10^{9} (15)	$\approx 1\times10^{11}$	"	$\approx 1\times10^{11}$	"	$> 1\times10^{11}$	.0891 (16)	D .0422 Q 23.8 G .023	.0954 (16)	Q 26.5 D .0400 G .025		7 Mar

Note:
(14) Approximate values. Contact pressure, not clipped. With Beckman on F to M measurement
(15) With Beckman due to high resistance
(16) Contact Pressure only, No clamping

Notes (continued)

15. Safety wire used to connect feed through wire. Low resistance (< 0.2 ohms) from both M & F sections to safety wire
16. Inadvertently applied 250v in M/F resistance test. Rotation of F ring done to re-achieve 1×10^{8} M/F resistance.

Speciman ID	Volume Resistance (Ohms) Beckman (A) Fluke (B)		Female to Male Resistance (Ohms)	Male Resistance To Fuel Tube (Ohms)		Female Resistance To Fuel Tube (Ohms)		T/T Resistance Fuel Tube to Tube (Ohms)	Female Capacitance (nF) 1 khz, 1 VRMS		Male Capacitance (nF) 1 khz, 1 VRMS		M/F Safety Wire
	10 Volt	250 Volt	Fluke 77	10 Volt	250 Volt	10 Volt	250 Volt	10 Volts	Cap.	Q D G	Cap.	Q D G	Y/N
O-ring #1	6.5K (B)												
O-ring #2	7.0×10^{7} (A)	2.4×10^{7} (A)											
O-ring #3	8.7K (B)												
O-ring #4	28.5K (B)												
O-ring #5	37.0K (B)												
O-ring #6	1.0×10^{7} (A)	2.6×10^{6} (A)											
Silicon O-ring #7	9.5×10^{10} (A)	9.0×10^{10} (A)											
Carbon O-ring #8	71×10^{12} (A)	71×10^{12} (A)											
Nitrile O-ring #9	4.75×10^{7} (A)	< 50K (A)											