



TEST REPORT: EL-2001-10-019A
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REQUESTED BY: Bill Spink
DATES TESTED: 2002 Jan. 7 – 2002 March 19
DATE: 2002 March 21

SUBJECT: MEG-ARRAY[®] Telcordia product qualification.

PURPOSE: This report summarizes testing to the specification Telcordia GR-1217-CORE (rev. 1995) New Technology Section 7 for MEG-ARRAY product.

CONCLUSIONS: The samples tested met the level III Central Office requirements of Telcordia GR-1217-CORE with 25 durability cycles.

SAMPLE GROUP DESCRIPTION

The samples consisted of:

- EPR 1028Ni1 - 0mm, 400 position MEG-ARRAY plug assemblies, 50µin Au.
- EPR 1027Ni1 - 4mm, 400 position MEG-ARRAY receptacle assemblies, 50µin Au.

Samples for all testing were received on 1/07/2002. All samples were examined upon receipt and were found to be suitable for the requested testing.

Samples that received contact resistance measurements were soldered to contact resistance test boards SK-38711 Rev. 2 (plugs) and SK-39042 Rev. 2 (receptacles). Those needing event detection monitoring were soldered to continuity boards SK-39872 Rev. 4 (plugs) and SK-39875 Rev. 4 (receptacles). The boards were fitted with press-fit BERGSTIK[®] pin headers for attachment of monitoring equipment.

PROCEDURE/RESULTS

TEMPERATURE LIFE

Sample Group:

– 4 pairs.

Specification Limit:

- Initial LLCR < 20mΩ per individual contact interface.
- ΔLLCR – Refer to Table 1.

Minimum No. Contacts to be Tested	Quality Level	>5mΩ	>10mΩ	>50mΩ
500	II	-	-	0.1%
500	III	3%	1%	0%

Test Sequence:

1. Visual inspection of product.
2. Initial LLCR.
3. Environmental Exposure to 85°C for 500 hrs (~21 days), mated condition.
4. Final LLCR.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23 with the exception that thermal EMF compensation was handled internally to the Keithley 580 operation. The results are shown in Table 2.

	Initial	Deltas
No. Data Points	800	800
Maximum	11.664	2.854
Minimum	6.314	-0.999
Overall Mean	8.549	0.591
Overall St. Dev.	0.889	0.539
No. > 20	0	
% > 5		0

THERMAL SHOCK/MOISTURE RESISTANCE

Sample Groups:

- 4 pairs for resistance measurements and 1 pair for discontinuity monitoring.
- 1 set unmated for IR and DWV measurements.

Specification Limits:

- Initial LLCR < 20mΩ per individual contact interface.
- ΔLLCR – Refer to Table 1.
- IR – 1000MΩ minimum (final).
- DWV (initial and final) - no breakdown, flashover, and/or leakage current >1.0mA at a test voltage equal to 200V RMS with a 60 second voltage hold dwell.
- 1μs event detection.

Test Sequence:

1. Visual inspection.
2. Initial IR and DWV.
3. Initial LLCR.
4. Thermal Shock exposure at :
 - -55°C to +85°C, 5 cycles
 - 30 minute dwell time at each temperature extreme.
 - Transfer rate < 1 minute.
 - 1μs event detection.
 - Mated condition - LLCR samples.
 - Unmated condition - IR/DWV samples.
5. LLCR.
6. Applied 12 durability cycles.
7. Applied dust as follows:
 - 9g/ft cubed of test chamber space.
 - Dust dried for one hour at 50°C.
 - Dust exposure for one hour at flow rate=360cfm.
 - Let samples set for one hour in chamber after exposure.
8. LLCR.
9. Moisture Resistance environment exposure:
 - +25°C to +65°C at 90-95% Relative Humidity.
 - 100 cycles (500 hours), 1 cycle equals 1hr transition from +25°C to +65°C with a 3hr dwell at +65°C and a 1hr transition from +65°C to +25°C.
 - Mated condition - LLCR samples.
 - Unmated condition - IR/DWV samples.
10. Final LLCR.
11. Final IR/DW.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23 with the exception that thermal EMF compensation was handled internally to the Keithley 580 operation. The results are shown in Table 3.

Table 3. LLCR Summary for Thermal Shock/Moisture Resistance.				
(Values in mΩ)				
	Initial	Post Thermal Shock Deltas	Post Dust Deltas	Post Moisture Environment Deltas
No. Data Points	800	800	800	800
Maximum	11.928	1.161	0.870	0.348
Minimum	6.160	-2.370	-3.126	-3.617
Overall Mean	8.655	-0.117	-0.397	-0.821
Overall St. Dev.	1.055	0.520	0.519	0.571
No. > 20	0			
% > 5		0	0	0

Insulation Resistance/Dielectric Withstanding Voltage (IR/DWV)

The testing was performed in accordance with industry standard EIA-364-20. 200VDC were applied for 60 seconds between 10 contacts within the same row (adjacent) and 10 contacts between rows (opposite) at room temperature and 33% humidity. All measurements passed the specified requirements of no breakdown, flashover, and/or leakage current >1.0mA at a test voltage equal to 200V RMS with a 60 second voltage hold dwell, and a 1000MΩ minimum insulation resistance – both after thermal shock and Moisture Resistance.

Discontinuity Monitoring

One sample pair was attached to continuity boards and then fitted with BERGSTIK pin headers for attachment to monitoring equipment. The sample was monitored during thermal shock with 1μs detection. No events of 1μs or greater were detected.

MIXED FLOWING GAS (MFG) – CENTRAL OFFICE, PARALLEL RUN METHOD

Sample Groups:

- 16 pairs on LLCR PCB's – 4 sets.
 - A. 2 sets unmated without pick-up caps, 2 sets mated.
 - B. 2 sets unmated with pick-up caps, 2 sets mated.
 - C. 2 receptacle assemblies unmated without pick-up caps (plug assemblies not exposed to gas), 2 sets mated.
 - D. 2 plug assemblies unmated without pick-up caps (receptacle assemblies not exposed to gas), 2 sets mated.

Specification Limits:

- Initial LLCR < 20mΩ per individual contact interface.
- ΔLLCR – Refer to Table 1.
- Gas corrosion rates of 15 +/-3 μg/cm²-day.

Test Sequence:

1. Visual Inspection.
2. Initial LLCR.
3. Applied 12 durability cycles.
4. LLCR.
5. MFG exposure:
 - 10 days.
 - NO₂=200ppb (+/-50ppb), H₂S=10ppb (+/-5ppb), CL₂=10ppb (+/-3ppb), SO₂=100ppb (+/-20ppb).
 - RH=70% (+/-2%), Temperature=30C (+/-1C).
 - LLCR.
6. Interface disturbance of ~.004in.
7. LLCR.
8. Applied 13 durability cycles.
9. Final LLCR.

The average corrosion rate for the 10 days of exposure was 18.1 μg/cm²-day.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23 with the exception that thermal EMF compensation was handled internally to the Keithley 580 operation. The results are shown in Tables 4 through 11.

Table 4. LLCR Summary for Mixed Flowing Gas, Group A, Unmated.					
(Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	10.271	1.604	6.677	2.852	4.055
Minimum	5.937	-1.643	-2.006	-2.011	-2.041
Overall Mean	8.393	-0.132	0.081	-0.046	-0.358
Overall St. Dev.	0.902	0.288	0.726	0.483	0.562
No. > 20	0				
% > 5		0	.5	0	0
% > 10		0	0	0	0

Table 5. LLCR Summary for Mixed Flowing Gas, Group A, Mated. (Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	12.014	1.224	2.002	2.296	3.346
Minimum	6.179	-2.357	-2.127	-1.749	-1.848
Overall Mean	8.303	0.106	-0.045	0.181	0.542
Overall St. Dev.	0.931	0.449	0.554	0.521	0.640
No. > 20	0				
% > 5		0	0	0	0

Table 6. LLCR Summary for Mixed Flowing Gas, Group B, Unmated With Caps. (Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	11.773	3.838	2.150	1.777	3.825
Minimum	6.135	-3.152	-3.390	-4.120	-3.619
Overall Mean	8.430	-0.105	-0.266	-0.152	-0.031
Overall St. Dev.	0.959	0.441	0.531	0.539	0.812
No. > 20	0				
% > 5		0	0	0	0

Table 7. LLCR Summary for Mixed Flowing Gas, Group B, Mated. (Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	13.748	22.814	1.623	2.733	3.422
Minimum	6.191	-1.044	-2.719	-2.751	-2.289
Overall Mean	8.562	0.126	-0.268	-0.218	0.404
Overall St. Dev.	1.017	1.187	0.491	0.503	0.628
No. > 20	0				
% > 5		.25	0	0	0
% > 10		.25	0	0	0
% > 50		0	0	0	0

Table 8. LLCR Summary for Mixed Flowing Gas, Group C, Receptacles Unmated Without Caps. (Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	10.750	1.136	3.770	5.107	1.168
Minimum	5.958	-0.744	-1.870	-0.964	-2.470
Overall Mean	7.998	0.106	0.234	0.348	-0.121
Overall St. Dev.	0.735	0.335	0.596	0.591	0.378
No. > 20	0				
% > 5		0	0	.25	0
% > 10		0	0	0	0

Table 9. LLCR Summary for Mixed Flowing Gas, Group C, Mated.					
(Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	10.034	0.863	0.881	1.845	1.486
Minimum	6.331	-1.329	-1.652	-1.535	-1.216
Overall Mean	8.486	-0.010	-0.367	-0.121	-0.038
Overall St. Dev.	0.859	0.345	0.377	0.467	0.433
No. > 20	0				
% > 5		0	0	0	0

Table 10. LLCR Summary for Mixed Flowing Gas, Group D, Plugs Unmated without Caps.					
(Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	11.723	2.619	3.743	3.445	1.898
Minimum	6.253	-1.855	-2.680	-2.332	-2.112
Overall Mean	8.529	-0.198	-0.208	-0.409	-0.324
Overall St. Dev.	0.996	0.436	0.687	0.477	0.440
No. > 20	0				
% > 5		0	0	0	0

Table 11. LLCR Summary for Mixed Flowing Gas, Group D, Mated.					
(Values in mΩ)					
	Initial	Post 12 Cycle Deltas	Post Gas Exposure	Post Disturbed Deltas	Post 13 Cycle Deltas
No. Data Points	400	400	400	400	400
Maximum	10.405	1.383	1.978	2.235	2.914
Minimum	6.303	-1.262	-2.263	-1.920	-1.719
Overall Mean	8.554	0.021	-0.195	0.032	0.148
Overall St. Dev.	0.927	0.352	0.514	0.625	0.608
No. > 20	0				
% > 5		0	0	0	0

VIBRATION AND MECHANICAL SHOCK

Sample groups:

- 4 pairs for resistance measurements and 1 pair for discontinuity monitoring.

Specification Limits:

- Initial LLCR < 20mΩ per individual contact interface.
- ΔLLCR – Refer to Table 1.
- 1μs event detection.

Test Sequence:

1. Visual inspection.
2. Initial LLCR.
3. Applied 12 durability cycles.
4. Applied dust as follows:
 - 9g/ft cubed of test chamber space.
 - Dust dried for one hour at 50°C.
 - Dust exposure for one hour at flow rate=360cfm.
 - Let samples set for one hour in chamber after exposure.
5. LLCR.
6. Vibration Environmental Exposure – Axis 1.
 - Sinusoidal, 10 to 500Hz at 10g, 8 hrs per axis (Log sweep rate = 0.1 octave per minute).
 - 1μs event detection.
 - Each of three mutually perpendicular axes.
7. Mechanical Shock Environment – Axis 1.
 - 50g 11ms Pulse Duration, ½ sine, 3 shocks each axis, 3 mutually perpendicular planes (18 total shocks).
 - Each of three mutually perpendicular axes.
8. LLCR.
9. Applied 13 durability cycles.
10. Final LLCR.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23 with the exception that thermal EMF compensation was handled internally to the Keithley 580 operation. The results are shown in Table 12.

Table 12. LLCR Summary for Vibration and Mechanical Shock.				
(Values in mΩ)				
	Initial	Post Dust Deltas	Post Vibration & Shock Deltas	Post 13 Cycle Deltas
No. Data Points	800	800	800	800
Maximum	10.501	3.188	2.390	1.621
Minimum	6.146	-5.587	-1.329	-1.351
Overall Mean	8.279	0.126	0.106	-0.053
Overall St. Dev.	0.845	0.423	0.462	0.350
No. > 20	0			
% > 5		0	0	0

Discontinuity Monitoring

One sample pair was attached to continuity boards and then fitted with BERGSTIK pin headers for attachment to monitoring equipment. The sample was monitored during vibration for 1μs event detection. No detections occurred. The sample was rated as passed.

EQUIPMENT

Table 13. Equipment List		
ITEM NAME	V.G. NUMBER	CALIBRATION DUE DATE
Keithley 706 Scanner	S56831	N/A
Keithley 706 Scanner	Q316352	N/A
Blue M Dry Heat Oven	6858	04/02
Blue M Humidity Chamber	6474	04/02
Bausch and Lomb Microscope	6992	N/A
Bausch and Lomb Microscope	6613	N/A
Keithley 580 Multimeter	6851	7/02
Keithley 580 Multimeter	NTS56825	05/02
Cincinnati Sub-zero Thermal Shock Machine	7403	04/02
Vitrek 944i Dielectric Analyzer	6978	09/02
Davis Perception II Environmental Monitor	7645	10/02
4 Gas Corrosion Chamber	9613	C.B.U.
Umholtz-Dickie Vibration Table	SN 499	N/A
Umholtz-Dickie Vibration Controller	6929	11/02
Umholtz-Dickie Signal Conditioner	6927	11/02
Umholtz-Dickie Sine Control	6928	11/02
Umholtz-Dickie Accelerometer	6957	03/02
AnaTech Event Detector Model 32-102	6090	05/02
Avex Shock Machine (SM110 MP)	SN ED0107	N/A
Hi-Techniques Digital Oscilloscope (IQ400)	6924	02/03
Krohn-Hite Low Pass Filter (3200R)	6925	02/03
Endevco Charge Amplifier (2740B)	6926	02/03
Columbia Accelerometer (5011)	6961	02/03