QUALIFICATION TEST SUMMARY REPORT
ESR-9414
Qualification Type Testing of
Amphenol Corporation's 2M805 Series Connector

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REV. C
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1. PURPOSE OF TEST:

The purpose of this test summary is to define the test samples, test sequences and test methods required to verify that Amphenol 2M805 Series of connectors meet the applicable internal Amphenol requirements.

2. CONCLUSION:

All following test groups of Amphenol 2M805 series connectors satisfactorily completed the qualification tests outlined in L-40991-241 Rev D.

3. TEST AGENCY:

All tests and inspections were performed at and by the Amphenol Corporation, 40-60 Delaware Avenue, Sidney, NY 13838.

4. STANDARD TEST CONDITIONS:

Ambient Temperature: $20 \pm 5°C$

Ambient Humidity: $50 \pm 30\%$

5. TEST SAMPLES:

The following connector samples, wire, sealing plugs, and contacts were provided for qualification testing.

Amphenol Part Number	Description	Size	Coded Number	Total	Group				Spares
					1	2	3	4	
F7-678710-07P	Plug	8	2M805-002-16MT8-7PA	11	3	3		3	2
F7-678770-07S	Receptacle	8	2M805-004-02MT8-7SA	11	3	3		3	2
*805-002-16MT8-7PA	Plug	8	N/A	4	1	1		1	1
*805-004-02MT8-7SA	Receptacle	8	N/A	4	1	1		1	1
F7-696904-011	Backshell	8	2M620MS064MT11	14	4	4		4	2
FH-696386-008	Plug Shell Kit	8	N/A	4			2		2
FH-696608-008	Recept Shell	8	N/A	4			2		2
2M809-001	Pin	23	N/A	77					
2M809-002	Socket	23	N/A	77					
F9-678715-37S	Plug	15	2M805-002-16NF15-37SA	11	3	3		3	2
F9-678775-37P	Receptacle	15	2M805-004-02NF15-37PA	11	3	3		3	2
*805-002-16NF15-37SA	Plug	15	N/A	4	1	1		1	1
*805-004-02NF15-37PA	Receptacle	15	N/A	4	1	1		1	1
F9-696904-013	Backshell	15	2M620MS064NF13	14	4	4		4	2
FH-696386-015	Plug Shell Kit	15	N/A	4			2		2
FH-696608-015	Recept Shell	15	N/A	4			2		2
2M809-001	Pin	23	N/A	407					
2M809-002	Socket	23	N/A	407					
FH-678717-85P	Plug	19	2M805-002-16M19-85PA	8	3	3		3	2
FH-678777-85S	Receptacle	19	2M805-004-02M19-85SA	8	3	3		3	2
*805-002-16M19-85PA	Plug	19	N/A	3	1	1		1	1
*805-004-02M19-85SA	Receptacle	19	N/A	3	1	1		1	1
FH-696904-015	Backshell	19	2M620MS064NF15	10	4	4		4	2
FH-696386-019	Plug Shell Kit	19	N/A	4			2		2
FH-696608-019	Recept Shell	19	N/A	4			2		2
2M809-001	Pin	23	N/A	680					
2M809-002	Socket	23	N/A	680					
AS22759/11-24	Wire	24	N/A	AN					
AS22759/22-24	Wire (High Strength)	24	N/A	AN					

AN= As Needed
*Competitor Part Numbers

6. TEST SEQUENCES:
The samples shall be subjected to tests in order specified.

Qualification Test Sequences

Test Group 1		
TEST	MIL-DTL-38999 Requirement Paragraph	MIL-DTL-38999 Test Paragraph
Visual and mechanical examination **6X optical inspection**	3.1, 3.3, 3.4, 3.5, 3.52 and 3.53	4.5.1
Magnetic permeability **2μ Max**	3.3.4	4.5.48
Altitude Immersion **EIA-364-03**	3.13	4.5.9
Insulation resistance at ambient temperature **5000 MΩ @ 500 VDC**	3.14.1	4.5.10.1
Dielectric withstanding voltage at sea level **Less than 2 milli-amperes @ 500 VAC**	3.15	4.5.11.1
Durability **500 Cycles**	3.12	4.5.8
Shell-to-shell conductivity **Less than 2.5 millivolt drop at 1 amp**	3.29	4.5.25
Salt spray (Static test) **48 hr exposure, unmated**	3.17	4.5.13.1
Shell-to-shell conductivity **Less than 2.5 millivolt drop at 1 amp**	3.29	4.5.25
Post test examination **6X optical inspection**	3.52 and 3.53	4.5.49

Test Group 2		
TEST	MIL-DTL-38999 Requirement Paragraph	MIL-DTL-38999 Test Paragraph
Visual and mechanical examination **6X optical inspection**	3.1, 3.3, 3.4, 3.5, 3.52 and 3.53	4.5.1
Altitude- Low Temperature **40,000ft & -65C**	See EIA-364-105	
Insulation resistance at ambient temperature **5000 MΩ @ 500 VDC**	3.14.1	4.5.10.1
Dielectric withstanding voltage at sea level **Less than 2 milli-amperes @ 500 VAC**	3.15	4.5.11.1
Temperature Cycling (Shock) **-65C to +150C, 5 cycles**	3.8	4.5.4
Insulation resistance at Elevated temperature **1,000 MΩ @ 500VDC & 150C**	See EIA-364-21	
Dielectric withstanding voltage at altitude **Less than 2 milli-amperes @ 100VAC & 40,000ft**	See EIA-364-20	
Durability **500 Cycles**	3.12	4.5.8
Vibration (See paragraph 6.2 for further detail) **43.9g RMS, 60G sine**	3.27	4.5.23.2
Shock **300 G half-sine, 3 millisecond duration, 3 pulses in each direction of 3 axes (18 pulses), no discontinuities greater than1 micro-second.**	3.28	4.5.24.1
Humidity **10 days of 100% humidity cycles**	3.30	4.5.26
Insulation resistance at ambient temperature **5000 MΩ @ 500 VDC**	3.14.1	4.5.10.1
Dielectric withstanding voltage at sea level **Less than 2 milli-amperes @ 500 VAC**	3.15	4.5.11.1
Low Level Contact Resistance **20 milli-ohms Max (20mV max and 100mA max)**	See EIA-364-13B	
Contact Resistance **45mV Max voltage drop @ 3A**	See EIA-364-06	
Post test examination **6X optical inspection**	3.52 and 3.53	4.5.49

Test Group 3		
TEST	MIL-DTL-38999 Requirement Para.	MIL-DTL-38999 Test Para.
Visual and mechanical examination **6X optical inspection**	3.1, 3.3, 3.4, 3.5, 3.52 and 3.53	4.5.1
EMI Shielding-High Frequency (See 6.1) **Met minimum dB attenuation requirements for all frequencies (See Table 1)**	See EIA-364-66	
EMI Shielding-Low Frequency (See 6.1) **Met minimum dB attenuation requirements for all frequencies (See Table 2)**	3.32	4.5.28
Post test examination **6X optical inspection**	3.52 and 3.53	4.5.49

Test Group 4		
TEST	MIL-DTL-38999 Requirement Paragraph	MIL-DTL-38999L Test Paragraph
Visual and mechanical examination **6X optical inspection**	3.1, 3.3, 3.4, 3.5, 3.52 and 3.53	4.5.1
Sand and Dust **MIL- STD-810F, Method 510.4**	See MIL-STD-810F	
Immersion **1 meter water for 1 hour**	See MIL-STD-810F	
Post test examination **6X optical inspection**	3.52 and 3.53	4.5.49

6.1 EMI Testing Detail:

EMI Testing was completed to the following requirements:

Frequency	dB. Min. Attenuation
1 GHz	85
3 GHz	69
5 GHz	66
18 GHz	65

Table 1: Minimum Attenuation: High Frequency

Frequency	dB. Min. Attenuation
100 MHz	75
200 MHz	70
300 MHz	65
400 MHz	63
800 MHz	58
1000 MHz	55

Table 2: Minimum Attenuation: Low Frequency

6.2 Vibration Testing Detail:

Vibration, Random:

EIA-364-28F Condition V letter I with the following details:
Duration: 4 hours each of three axes
Temperature: Ambient
Frequency range: 50Hz to 2000Hz
37.8g RMS

After testing done above test connectors to MIL-DTL-38999 para. 4.5.23.2.3 (Series III)
EIA-364-28F Condition VI letter I with the following details:
Duration: 8 hours each of three axes
Temperature: Ambient
Frequency range: 50Hz to 2000Hz
43.9g RMS

Vibration, Sine:

Condition G. 12 sweep cycles per axis (3 axes), 20 minutes per 10-2000-10Hz sweep cycle, ambient temperature. (30G)

After testing done above test connectors to MIL-DTL-38999 para. 4.5.23.2.1 (Series III)
MIL-STD-202, Method 204
12 hrs per axis (3 axes), 20 minutes per 10-2000-10Hz
sweep cycle, ambient temperature. (60G)

7.0 SAMPLE PREPARATION/DEFINITION:

7.1 Group 1-Sample Breakdown

Two mated pairs of Amphenol Connectors, each connector size shall be prepared with two foot lengths of AS22759/11-24 wire.
Two mated pairs of Amphenol/Competitor Connectors, each connector size shall be prepared with two foot lengths of AS22759/11-24 wire. (Amphenol Plug-Competitor Receptacle, Amphenol Receptacle-Competitor Plug)

Part Number	Description	QTY	Size
F7-678710-07P	Plug	3	8
F7-678770-07S	Receptacle	3	8
F9-678715-37S	Plug	3	15
F9-678775-37P	Receptacle	3	15
FH-678717-85P	Plug	3	19
FH-678777-85S	Receptacle	3	19
805-002-16MT8-7PA	Plug	1	8
805-004-02MT8-7SA	Receptacle	1	8
805-002-16NF15-37SA	Plug	1	15
805-004-02NF15-37PA	Receptacle	1	15
805-002-16M19-85SA	Plug	1	19
805-004-02M19-85PA	Receptacle	1	19
FH-696904-011	Backshell	4	8
F9-696904-013	Backshell	4	15
F9-696904-017	Backshell	4	19
2M809-002	Socket	387	23
2M809-001	Pin	387	23
AS22759/11-24	Wire	AN	24
*AFM8 or similar	Crimp Tool	N/A	N/A
*K1461	Crimp Positioner	N/A	23

AN=As needed
*Crimp tool and crimp positioner are Daniels part numbers

7.2 Group 2-Sample Breakdown

Two mated pairs of each connector size shall be prepared with four foot lengths of AS22759/22-24 wire.
Two mated pairs of Amphenol/Competitor Connectors, each connector size shall be prepared with four foot lengths of AS22759/22-24 wire. (Amphenol Plug-Competitor Receptacle, Amphenol Receptacle-Competitor Plug)

*Samples in this group must use high strength wire only.

Part Number	Description	QTY	Size
F7-678710-07P	Plug	3	8
F7-678770-07S	Receptacle	3	8
F9-678715-37S	Plug	3	15
F9-678775-37P	Receptacle	3	15
FH-678717-85P	Plug	3	19
FH-678777-85S	Receptacle	3	19
805-002-16MT8-7PA	Plug	1	8
805-004-02MT8-7SA	Receptacle	1	8
805-002-16NF15-37SA	Plug	1	15
805-004-02NF15-37PA	Receptacle	1	15
805-002-16M19-85SA	Plug	1	19
805-004-02M19-85PA	Receptacle	1	19
FH-696904-011	Backshell	4	8
F9-696904-013	Backshell	4	15
F9-696904-017	Backshell	4	19
2M809-001	Pin	387	23
2M809-002	Socket	387	23
AS22759/22-24	HS Wire	AN	24
*AFM8 or similar	Crimp Tool	N/A	N/A
*K1461	Crimp Positioner	N/A	23

AN=As needed
*Crimp tool and crimp positioner are Daniels part numbers

7.3 Group 3-Sample Breakdown

Three mated pairs of each connector size, connectors consist of special Electroless Nickel plated modified shells for EMI (no inserts or contacts).

Part Number	Description	QTY	Size
FH-696386-008	Plug Shell Kit	2	8
FH-696608-008	Recept Shell	2	8
FH-696386-015	Plug Shell Kit	2	15
FH-696608-015	Recept Shell	2	15
FH-696386-019	Plug Shell Kit	2	19
FH-696608-019	Recept Shell	2	19

7.4 Group 4-Sample Breakdown

Two mated pairs of each connector size shall be prepared with two foot lengths of AS22759/11-24 wire.
Two mated pairs of Amphenol/Competitor Connectors, each connector size shall be prepared with two foot lengths of AS22759/11-24 wire. (Amphenol Plug-Competitor Receptacle, Amphenol Receptacle-Competitor Plug)

Part Number	Description	QTY	Size
F7-678710-07P	Plug	3	8
F7-678770-07S	Receptacle	3	8
F9-678715-37S	Plug	3	15
F9-678775-37P	Receptacle	3	15
FH-678717-85P	Plug	3	19
FH-678777-85S	Receptacle	3	19
805-002-16MT8-7PA	Plug	1	8
805-004-02MT8-7SA	Receptacle	1	8
805-002-16NF15-37SA	Plug	1	15
805-004-02NF15-37PA	Receptacle	1	15
805-002-16M19-85SA	Plug	1	19
805-004-02M19-85PA	Receptacle	1	19
FH-696904-011	Backshell	4	8
F9-696904-013	Backshell	4	15
F9-696904-017	Backshell	4	19
2M809-001	Pin	387	23
2M809-002	Socket	387	23
AS22759/11-24	Wire	AN	24
*AFM8 or similar	Crimp Tool	N/A	N/A
*K1461	Crimp Positioner	N/A	23

AN=As needed
*Crimp tool and crimp positioner are Daniels part numbers

8.0 Testing Matrix

Amphenol or Competitor Test Plan Part Number	**Competitor Test Plan 6220701**				**Amphenol QTP L-40991-241 Rev D**			
Product	**Competitor 805 Series**				**Amphenol 2M805 Series**			
	Test Group				**Test Group**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Test Group Summary	**Insert Retention, Salt Spray**	**Vibe, Shock**	**Durability**	**EMI**	**Insert Retention, Salt Spray**	**Vibe, Shock**	**EMI**	**Sand and Dust, Immersion**
	+Test Sequence				**+Test Sequence**			
Visual and Mechanical Examination	1	1	1	1	1	1	1	1
Insert Retention	7							
Magnetic Permeability	2				2			
***Altitude Immersion**					3			
Insulation resistance at ambient temperature	5	3,12			4	3,12		
Dielectric withstanding voltage at sea level	6	4,13			5	4,13		
Durability (500 cycles)			2		6	8		
Shell to shell conductivity	8,11		4,6		7,9			
Electrical Engagement	12							
Salt Spray	9				8			
Contact Retention		2						
***Altitude – Low Temperature**						2		
Temperature Cycling	3	5				5		
Insulation Resistance at Elevated Temperature		7				6		
Dielectric Withstanding Voltage at Sea Level		8				7		
»Vibration		9				**»9**		
Shock		10				10		
Humidity		11				11		
***Low Level Contact Resistance**						14		
***Contact Resistance**						15		
EMI Shielding Effectiveness				2			2	
***Sand and Dust**								2
***Immersion**								3
Coupling Torque	4,10	6	5					
Spring Finger Force			3					
Post Test Examination	13	14	7	3	10	16	3	4
Results or Scheduled Completion Date	**N/A**	**N/A**	**N/A**	**N/A**	**Passed**	**Passed**	**Passed**	**Passed**

***Testing not completed in Competitor's Test Plan**

+Numbers shown in Test Sequence detail the order in which tests were completed in each group.

»Vibration testing done at two levels, upper level of testing done at 38999 levels (See paragraph 6.2 for Specific Details)

»Vibration testing completed at levels above that of competition (38999 Series III)