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TEST REPORT FOR:

PETERS RESEARCH
Hooghe Weg 13
Kempen, GE 47906
Attn: Lars Linssen

MANUFACTURER'S PLANT LOCATION:
Same as above

SPECIFICATION:

MIL-I-46058C	July 7, 1972
Amendment 7	September 14, 1993

MATERIAL DESIGNATION:

Date in: September 13, 2010
Material Type: AR – ELPEGUARD® SL 1307 FLZ/&

TESTING PURPOSE:

Group B and C testing

TEST SUMMARY:

The test samples **met** the Group B and C requirements of MIL-I-46058C, Amendment 7. Testing not for military purposes.

APPROVED:

FOR
Keith Sellers
Managing Scientist

SAMPLE DISPOSITION:

Samples returned to the customer.

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APPEARANCE

TEST SPECIMEN:

Four glass panels coated with conformal coating

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.5 and 4.8.2

REQUIREMENT:

When coating materials are tested as specified in 4.8.2, the coating shall be smooth, homogeneous, transparent, unpigmented with no dye added. A colorless additive to impart fluorescence is allowed (see 3.2). The coating shall be free from bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, and peeling. The coating shall not mask or obliterate the identification markings and color codes on the electronic components. The coating shall not discolor the printed conductors and base materials greater that the discoloration caused by conditioning when uncoated. The coating shall not corrode any metals being coated.

METHOD:

The test specimens were examined visually for bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, and corrosion with the aid of a 10X power magnification viewer under ultra-violet illumination. Bubbles in the conformal coating were visually assessed with normal (corrected 20/20) vision.

Note: Only types SR and XY shall be examined under normal light.

RESULTS:

There was no evidence of bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, or corrosion of the conformal coating.

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COATING THICKNESS

TEST SPECIMEN:

Four glass panels coated with conformal coating

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.6 and 4.8.3

REQUIREMENT:

When measured as specified in 4.8.3, the coating thickness for types AR, ER, and UR shall be 0.002" ±0.001". For type SR, the coating thickness shall be 0.005" ±0.003". For type XY, the coating thickness shall be within the range of 0.0005"- 0.0020".

METHOD:

A micrometer was used to measure the conformal coating over the glass slide. Three measurements were obtained and averaged for the final coating thickness measurement.

RESULTS:

The conformal coating thickness is as follows:

Coating Thickness	Specimen			
	1	2	3	4
Area 1	0.00230	0.00220	0.00230	0.00195
Area 2	0.00220	0.00215	0.00210	0.00190
Area 3	0.00220	0.00255	0.00235	0.00200
Average	0.00223	0.00230	0.00225	0.00195

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FUNGUS RESISTANCE

TEST SPECIMEN:

Four glass panels coated with conformal coating

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.7 and 4.8.4, test method ASTM G 21-96 (2002)

REQUIREMENT:

When coating materials are tested as specified in 4.8.3, the cured film shall resist the growth of fungi and shall have a rating of "0".

Observed Growth on Specimens
(Sporulating or Non-Sporulating, or Both)

Observation	Rating
None	0
Traces of growth (less than 10%)	1
Light growth (10 to 30%)	2
Medium growth (30 to 60%)	3
Heavy growth (60% to complete coverage)	4

Note: Continuous cobwebby growth extending over the entire specimen, even though not obscuring the specimen, should be rated as two.

METHOD:

The test fungi used are:

Aspergillus niger
Chaetomium globosum
Gliocladium virans
Aureobasidium pullulans
Penicillium funiculosum

The cultures of each microorganism were maintained separately on potato dextrose agar medium, except for the Chaetomium globosum which was inoculated on strips of filter paper on the surface of mineral salts agar.

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A spore suspension was prepared two weeks after inoculation and incubation of the microorganisms by pouring into one subculture of each fungus, a 10-ml portion of a sterile solution containing 0.05 g per liter of a non-toxic wetting agent such as sodium dioctyl sulfosuccinate.

Using a sterile inoculating loop the surface growth of each culture was gently scraped to remove it from the agar. The spore charge was poured into a sterile
125 ml glass-stopped Erlenmeyer flask containing 45 ml of sterile water and
10 - 15 solid glass beads (5 mm in diameter). The flask was vigorously shaken in order to liberate the spores from the fruiting bodies and to break up the spore clumps. The dispersed fungal spore suspension was filtered through a 6 mm layer of glass wool contained in a glass funnel, into a sterile test tube.

This process removed large mycelial fragments and clumps of agar, which could interfere with the spraying process.

The test tubes containing the filtered spore suspension, were placed in a centrifuge for 20 minutes. The supernatant liquid was discarded. The residue was resuspended with sterile water and again placed in the centrifuge. The spores were washed in this manner three times. The final washed residue was resuspended with sterile mineral salts solution in such a manner that the resultant spore suspension contained 1,000,000 ± 200,000 spores per ml as determined with a counting chamber.

This operation was repeated for each organism used in the test and equal volumes of the resultant spore suspension was blended to obtain the final mixed spore suspension. The spore suspension may be prepared fresh each day or may be held at $6^{o} \pm 4^{o}$C for not more than 7 days.

Viability of Inoculum Control

With each test specimen group, three pieces of sterilized filter paper, one inch square, were placed on hardened mineral salts agar in separate Petri dishes. They were inoculated with the spore suspension by spraying from a sterilized atomizer until initiation of droplet coalescence. The strips were incubated at 30^{o}C (86^{o}F) at a relative humidity of 85%. They were examined after fourteen days of incubation. If the cultures did not show growth, the procedure was repeated.

In addition to the viability of inoculum control, a known susceptible substrate (a sterile cotton strip) was inoculated along with the test item to ensure that proper conditions were present in the incubation chamber to promote fungus growth. The control strip was dipped in a solution containing 10% glycerol, 0.1% potassium dihydrogen orthophosphate, 0.1% ammonium nitrate, 0.025% magnesium sulfate, and 0.05% yeast extract (pH 5.3). The excess liquid was removed prior to inoculation.

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Inoculation of Test and Control Item

The test and control items were suspended on suitable fixtures. No cleaning of the test specimen took place for at least 72 hours prior to inoculation. The chamber was preconditioned at 30°C and 85% minimum relative humidity.

The test samples and the control were sprayed with the spore suspension and incubation period began. The test specimens were exposed to a static temperature of 30°C with a minimum humidity of 85%.

Note: Covered dishes containing nutrient agar are considered to have the desired humidity. Covers on large dishes may be sealed with masking tape.

After 7 days, the control and test specimens were visually examined for fungal growth. Visual fungal growth on the control specimens indicated that the environmental conditions were suitable for fungal growth. If there were an absence of growth on the control specimens, it would suggest that the environmental conditions are unsuitable for maximum fungal growth. (If this is the case the entire test must be repeated.)
If the control items showed satisfactory fungus growth, the test was continued for a period of 28 days from the time of inoculation, or as specified.

After 28 days, the samples were visually examined for evidence of fungal growth.

RESULTS:

Visual Examination	GROWTH RATING OF TEST SPECIMENS				
	Control	1	2	3	4
After 7 days	1	0	0	0	0
After 14 days	3	0	0	0	0
After 21 days	3	0	0	0	0
After 28 days	4	0	0	0	0

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SHELF LIFE

TEST SPECIMEN:

Four previously prepared y-pattern coupons

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.8 and 4.8.5.

REQUIREMENT:

When coating materials are tested in accordance with 4.8.5, the appearance, insulation resistance, and dielectric withstanding voltage shall meet the requirements of 3.5, 3.9, and 3.10 respectively.

Appearance – When coating materials are tested as specified in 4.8.2, the coating shall be smooth, homogeneous, transparent, unpigmented with no dye added. A colorless additive to impart fluorescence is allowed (see 3.2). The coating shall be free from bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, and peeling. The coating shall not mask or obliterate the identification markings and color codes on the electronic components. The coating shall not discolor the printed conductors and base materials greater that the discoloration caused by conditioning when uncoated. The coating shall not corrode any metals being coated.

Insulation Resistance - The average insulation resistance reading of all coated specimens shall be a minimum of 2.50E+06 megohms (2.50E+12 ohms). The insulation resistance reading for each individual coated specimen shall not be less than 1.50E+06 megohms (1.50E+12 ohms), unless otherwise specified.

Dielectric Withstanding Voltage - When coating materials are tested as specified in 4.8.7, there shall be no disruptive discharge evidenced by flashover (surface discharge), sparkover (air discharge), or breakdown (puncture discharge). The leakage rate shall not exceed 10 microamperes.

METHOD:

The conformal coating was stored at Peters facility for six months. The test samples were coated with the stored specimen and tested for the following:

Appearance - The test specimens were examined visually for bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, and corrosion with the aid of a 10X power magnification viewer under ultra-violet illumination. Types SR and XY shall be examined under normal light. Normal or corrected 20/20 vision was used to examine the specimens for bubbles.

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Insulation Resistance - The insulation resistance measurements were taken using a High Resistance Meter, with one-minute electrification time and 500 VDC applied.

Dielectric Withstanding Voltage - The two electrodes of the hi-pot tester were connected to the insulated wires which were attached to the plated through holes on the y-pattern. One hundred VAC were applied per second until achieving 1500VAC. Once 1500VAC was achieved, the specimens were held at this voltage for one minute. The leakage current was recorded.

RESULTS:

Appearance:

There was no evidence of bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, or corrosion of the conformal coating.

Insulation Resistance - The insulation resistance readings in megohms are as follows:

Specimen	Insulation Resistance
1	4.23E+12
2	3.78E+12
3	5.66E+12
4	4.94E+12
Average	4.65E+12

Dielectric Withstanding Voltage:

There was no evidence of disruptive discharge evidenced by flashover (surface discharge), sparkover (air discharge), or breakdown (puncture discharge).

The leakage rate did not exceed 10 microamperes.

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Q-RESONANCE

TEST SPECIMEN:

Four previously prepared y-pattern coupons

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.11 and 4.8.8

REQUIREMENT:

When coating materials are tested as specified in 4.8.8, the average percentage change in Q shall not exceed the values specified below.

Conditioning	Measurement Frequency	Max. Allowable Percentage Change in Q				
		Type AR	Type ER	Type SR	Type UR	Type XY
Before and after coating	1 MHz	9	8	8	5	9
	50 MHz	19	10	12	8	7
Before and after immersion in distilled water	1 MHz	9	12	10	10	11
	50MHz	5	15	12	10	7

Note: The highlighted areas were used for accept/reject criteria.

METHOD:

Twenty-two gauge wires were attached to the plated through holes on the y-patterns and the specimens were cleaned. The uncoated y-patterns were initially measured for Q Resonance at 1 and 50 MHz using a Q Meter and the results were recorded. After the initial Q resonance measurements were obtained, the y-patterns were coated with conformal coating. The conformal coated y-patterns were again measured for Q Resonance at 1 and 50 MHz using a Q Meter and the results were record. The test specimens were immersed in deionized water for 24 hours and within 2 hours, the measurements for Q Resonance were taken again at 1 and 50 MHz and the results were recorded. Q and C values have been adjusted within the accuracy limits of the equipment to obtain acceptable values for Q Resonance. For example, when Q1 and Q2 are identical, the Q equation is incalculable due to a 0 denominator. The limitations of this test method have been brought to DSCC's attention. Q Resonance was calculated as follows:

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$$Q_x = \frac{Q_1 Q_2 (C_1 - C_2)}{(Q_1 - Q_2) C_1}$$

Where:

Q_1 = without sample
C_1 = capacitance without sample
Q_2 = with sample
C_2 = capacitance with sample

RESULTS:

FREQUENCY 1MHZ		
Condition	Test Sample	Q-Resonance
Before Coating	1	61
	2	59
	3	59
	4	59
	Average	59
After Coating	1	62
	2	61
	3	65
	4	65
	Average	64
	% Change after Coating	7.2%
After Water Immersion	1	64
	2	65
	3	63
	4	63
	Average	64
	% Change after Immersion	-0.6%

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FREQUENCY 50MHZ		
Condition	Test Sample	Q-Resonance
Before Coating	1	192
	2	192
	3	192
	4	192
	Average	192
After Coating	1	195
	2	218
	3	214
	4	214
	Average	210
	% Change after Coating	9.3%
After Water Immersion	1	205
	2	190
	3	209
	4	209
	Average	203
	% Change after Immersion	3.4%

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THERMAL SHOCK

TEST SPECIMEN:

Four previously prepared y-pattern coupons used for the Q-Resonance testing.

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.12 and 4.8.9, MIL-STD-202, method 107, test condition B-2, method 301.

REQUIREMENT:

When coating materials are tested as specified in 4.8.9, the appearance and dielectric withstanding voltage shall meet the requirements of 3.5 and 3.10, respectively.

Appearance – When coating materials are tested as specified in 4.8.2, the coating shall be smooth, homogeneous, transparent, unpigmented with no dye added. A colorless additive to impart fluorescence is allowed (see 3.2). The coating shall be free from bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, and peeling. The coating shall not mask or obliterate the identification markings and color codes on the electronic components. The coating shall not discolor the printed conductors and base materials greater that the discoloration caused by conditioning when uncoated. The coating shall not corrode any metals being coated.

Dielectric Withstanding Voltage – When coating materials are tested as specified in 4.8.7, there shall be no disruptive discharge evidenced by flashover (surface discharge), sparkover (air discharge), or breakdown (puncture discharge). The leakage rate shall not exceed 10 microamperes.

METHOD:

Thermal Shock - The test specimens were placed in a Thermal Shock chamber. The cold chamber was set at -65°C, +0°C, -5°C, the hot chamber was set at 125°C, the transfer time was set at 15 seconds, the dwell time at each temperature was set at 30 minutes, the temperature recovery time was established at 1.2 minutes in hot and 0.7 minutes in cold. The chamber was set for 50 cycles. Upon completion of the 50 cycles, the specimens were removed from the test chamber and tested for the appearance and dielectric withstanding voltage.

Appearance - The test specimens were examined visually for bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, and corrosion with the aid of a 10X power magnification viewer under ultra-violet illumination. Types SR and XY shall

be examined under normal light. Normal or corrected 20/20 vision was used to examine the specimens for bubbles.

Dielectric Withstanding Voltage - The two electrodes of the hi-pot tester were connected to the insulated wires which were attached to the plated through holes on the y-pattern. One hundred VAC were applied per second until achieving 1500VAC. Once 1500VAC was achieved, the specimens were held at this voltage for one minute. The leakage current was recorded.

RESULTS:

After the 50 cycles of thermal shock the following observations were recorded:

Appearance:

There was no evidence of bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, or corrosion of the conformal coating.

Dielectric Withstanding Voltage:

There was no evidence of disruptive discharge evidenced by flashover (surface discharge), sparkover (air discharge), or breakdown (puncture discharge).

The leakage rate did not exceed 10 microamperes.

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INSULATION RESISTANCE

TEST SPECIMEN:

Four previously prepared y-pattern coupons

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.9 and 4.8.6

REQUIREMENT:

When coating materials are tested as specified in 4.8.6, the average of the insulation resistance of all coated specimens shall be a minimum of 2.50E+06 megohms (2.50E+12 ohms), unless otherwise specified. The insulation resistance for each coated specimen shall be not less than 1.50E+06 megohms (1.50E+12 ohms), unless otherwise specified.

METHOD:

The initial insulation resistance measurements were obtained with an applied test voltage of 500 VDC (which had been applied for 1 minute prior to taking the measurements).

RESULTS:

The insulation resistance of the test specimens was as follows:

Test Specimen	Insulation Resistance (Ohms)
1	3.40E+12
2	4.97E+12
3	8.19E+12
4	3.24E+12
Average	4.95E+12

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MOISTURE AND INSULATION RESISTANCE

TEST SPECIMEN:

Four previously prepared y-pattern coupons

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.13 and 4.8.10, MIL-STD-202, method 106, less steps 7a and 7b

REQUIREMENT:

When coating materials are tested as specified in 4.8.10, the appearance and dielectric withstanding voltage shall meet the requirements of 3.5 and 3.10 respectively; and the average of the insulation resistance of all coated specimens shall be as a minimum of 1.00E+04 megohms (1.00E+10 ohms) for types AR, SR, UR and XY; and 1.00E+03 megohms (1.00E+09 ohms) for type ER. The insulation resistance for each coated specimen shall be not less than 5.00E+03 megohms (5.00E+09 ohms) for types AR, SR, UR and XY; and 5.00E+02 megohms (5.00E+08 ohms) for type ER.

Appearance – When coating materials are tested as specified in 4.8.2, the coating shall be smooth, homogeneous, transparent, unpigmented with no dye added. A colorless additive to impart fluorescence is allowed (see 3.2). The coating shall be free from bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, and peeling. The coating shall not mask or obliterate the identification markings and color codes on the electronic components. The coating shall not discolor the printed conductors and base materials greater that the discoloration caused by conditioning when uncoated. The coating shall not corrode any metals being coated.

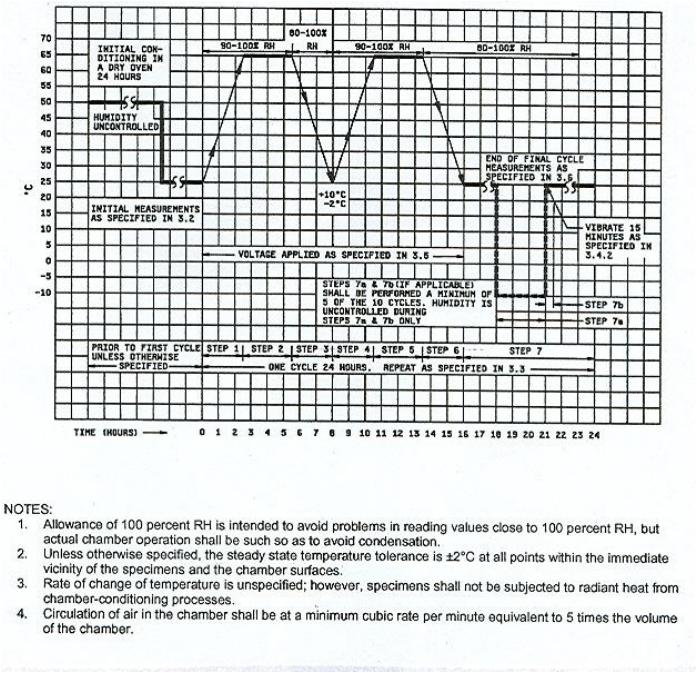
Dielectric Withstanding Voltage - When coating materials are tested as specified in 4.8.7, there shall be no disruptive discharge evidenced by flashover (surface discharge), sparkover (air discharge), or breakdown (puncture discharge). The leakage rate shall not exceed 10 microamperes.

METHOD:

The specimens were preconditioned at 50°C in an oven for 24 hours. The initial insulation resistance measurements were taken with 500VDC after an electrification time of one minute at room ambient conditions. The resistance values were recorded. The specimens were then placed in the center of a humidity chamber. The insulated wires, which were attached to the plated through holes of the y-patterns, were dressed through the porthole to the outside of the test chamber. The porthole was sealed with a rubber stopper to inhibit moisture and humidity from escaping. The chamber door was closed and the test chamber activated. A polarizing voltage of 100 VDC was applied using a power supply for the duration

of the chamber time. One set of test points were connected to the positive terminal and the other set of test points were connected to the negative terminal of the power supply. The test specimens were exposed to 10 continuous cycles of temperature and humidity. The polarizing voltage was maintained throughout chamber exposure.

The temperature and humidity cycle profile is as follows:



NOTES:
1. Allowance of 100 percent RH is intended to avoid problems in reading values close to 100 percent RH, but actual chamber operation shall be such so as to avoid condensation.
2. Unless otherwise specified, the steady state temperature tolerance is ±2°C at all points within the immediate vicinity of the specimens and the chamber surfaces.
3. Rate of change of temperature is unspecified; however, specimens shall not be subjected to radiant heat from chamber-conditioning processes.
4. Circulation of air in the chamber shall be at a minimum cubic rate per minute equivalent to 5 times the volume of the chamber.

Graphical representation of moisture-resistance test, MIL-STD-202G, method 106G

The conformal coated test specimens were tested according to the temperature and humidity profile, with the following exceptions:

- The low temperature and vibration was omitted.
- Insulation Resistance measurements were taken during step 5 of the first, fourth, seventh and tenth cycles, at the 65° ±2°C, 90% - 95% relative humidity conditions.
- Following step 6 of the final cycle of the Moisture Resistance test, the panels were maintained at a temperature of 25° ±2°C, and a relative humidity of 50% ±5%, for a period of 24 hours, after which Appearance, Insulation Resistance, and Dielectric Withstanding Voltage tests were performed.

Appearance - The test specimens were examined visually for bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, and corrosion

with the aid of a 10X power magnification viewer under ultra-violet illumination. Types SR and XY shall be examined under normal light. Normal or corrected 20/20 vision was used to examine the specimens for bubbles.

Dielectric Withstanding Voltage - The two electrodes of the hi-pot tester were connected to the insulated wires which were attached to the plated through holes on the y-pattern. One hundred VAC were applied per second until achieving 1500VAC. Once 1500VAC was achieved, the specimens were held at this voltage for one minute. The leakage current was recorded.

RESULTS:

Appearance before exposure to humidity:

There was no evidence of bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, or corrosion of the conformal coating.

Insulation Resistance measurements:

Condition	Sample	Insulation Resistance (Ohms)
Initial	1	3.40E+12
	2	4.97E+12
	3	8.19E+12
	4	3.24E+12
	Average	4.95E+12
1st Cycle	1	3.77E+11
	2	5.84E+11
	3	5.62E+11
	4	2.41E+11
	Average	4.41E+11
4th Cycle	1	2.37E+11
	2	6.42E+11
	3	2.89E+11
	4	4.25E+11
	Average	3.98E+11

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Condition	Sample	Insulation Resistance (Ohms)
7th Cycle	1	1.98E+11
	2	1.50E+11
	3	4.43E+11
	4	3.19E+11
	Average	2.78E+11
10th Cycle	1	3.45E+11
	2	1.31E+11
	3	7.27E+11
	4	2.10E+11
	Average	3.53E+11
After 24 Hours	1	3.63E+12
25°C± 2°C/50% RH	2	4.26E+12
	3	6.45E+12
	4	5.57E+12
	Average	4.98E+12

Appearance:

There was no evidence of bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, peeling, masking, obliteration of identification markings, discoloration, or corrosion of the conformal coating.

Dielectric Withstanding Voltage:

There was no evidence of disruptive discharge evidenced by flashover (surface discharge), sparkover (air discharge), or breakdown (puncture discharge).

The leakage rate did not exceed 10 microamperes.

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FLEXIBILITY

TEST SPECIMEN:

Four tin panels coated with conformal coating.

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.14 and 4.8.11, and FED-STD-141, method 6221.

REQUIREMENT:

When coating materials are tested as specified in 4.8.11, there shall be no evidence of cracking or crazing.

METHOD:

A 1/8" diameter mandrel was placed in the center of the coated tin panel. The panel was then bent 180° in approximately 1 second. The specimens were examined for cracking and/or crazing of the conformal coating.

RESULTS:

The test samples did not exhibit cracking or crazing of the conformal coating.

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THERMAL-HUMIDITY

TEST SPECIMEN:

Four previously prepared y-pattern coupons

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.15 - 3.15.2 and 4.8.12, and FED-STD-141, method 4061 (dry-through for varnish, lacquers, and enamels)

REQUIREMENT:

Thermal Humidity Aging. When tested as specified in 4.8.12, the coating materials shall meet the following requirements:

Hydrolytic Stability - There shall be no evidence of reversion as indicated by softening, chalking, blistering, cracking, tackiness, loss of adhesion, or liquefaction.

Discoloration - The examination shall determine legibility and distinguishability of the identification markings and color codes used to identify parts.

METHOD:

Thermal Humidity:

One y-pattern was not exposed and served as a control. The remaining test samples were placed in an appropriate test vehicle in order to maintain 85^{o} ±1^{o}C and 95 ±4% relative humidity. The test samples were exposed to the test conditions for 120 days.

The test samples were examined at the at the following intervals:

After 28, 56, and 84 days, the panels were returned to 25^{o}C and 50% relative humidity and held for 2 hours. The specimens were compared to the control y-pattern and results were recorded. After visual examination the specimens were returned to the test vehicle for continuing exposure.

After 120 days, the panels were returned to 25^{o}C and 50% relative humidity and held for 7 days. The specimens were compared to the control y-pattern and results were recorded.

Tackiness Test Method:

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1. The test panel was placed in the horizontal position at a height such that, when the thumb is placed horizontally on the conformal coating, the arm of the operator is in a vertical straight line from the wrist to shoulder.
2. Bear down on the conformal coating with the thumb, exerting the maximum pressure of the arm and at the same time turning the thumb through an angle of 90° in the plane of the film.
3. The film shall be considered dry-through when no loosening, detachment, wrinkling, or other distortion of the conformal coating occurs.

RESULTS:

Visual Examination:

Visual Exam Interval	Test Specimen			
	1 (Control)	2	3	4
Initial	Clear	Clear	Clear	Clear
After 28 days	Not Applicable	No Change	No Change	No Change
After 56 days	Not Applicable	No Change	No Change	No Change
After 84 days	Not Applicable	No Change	No Change	No Change
After 127 days	Not Applicable	No Change	No Change	No Change

Hydrolytic Stability:

There was no evidence of reversion as indicated by softening, chalking, blistering, cracking, tackiness, loss of adhesion, or liquefaction of the conformal coating.

Discoloration:

The visual examination verified that the conformal coating did not obliterate legibility and distinguishability of the identification markings and color codes of the resistors.

Tackiness:

There was no loosening, detachment, wrinkling, or other distortion of the conformal coating.

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FLAME RESISTANCE

TEST SPECIMEN:

Four glass epoxy strips, coated with conformal coating.

REFERENCE:

MIL-I-46058C, Amendment 7, paragraphs 3.16 and 4.8.13, and FED-STD-406, method 2021.

REQUIREMENT:

When coating materials are tested as specified in 4.8.13, the coating shall be self-extinguishing or non-burning.

METHOD:

Each specimen was clamped in a support at the end farthest from the one inch mark, with its longitudinal axis horizontal, and its transverse axis inclined at 45° to the horizontal. Under the specimen, a four inch square piece of gauge was placed in a horizontal position 3/8" below the edge of the specimen and with about ½" of the specimen extending beyond the edge of the gauge.

A standard 3/8" bunsen burner, with air ports open to produce a blue flame approximately 1" high, was placed under the free end of the specimen and adjusted so that the flame tip is just in contact with the specimen. At the end of 30 seconds the flame was removed and the specimen was allowed to burn.

Time and extent of burning were measured and reported if the specimen did not burn 3.94". An average burning rate was reported for the material if it burned to the 3.94" mark from the ignited end.

RESULTS:

The test specimens did not reach the 25mm reference mark, therefore, the rate of burn could not be calculated.

Test Specimen	Burn Time (seconds)	Length (inches)
1	0	0
2	0	0
3	0	0
4	0	0

These values qualify the product as self-extinguishing.

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Trace Laboratories, Inc. certifies that the test equipment used complies with the calibration test purposes of ISO 10012-1, ANSI/NCSL Z540-1-1994, and MIL-STD-45662A and that the data contained in this report is accurate within the tolerance limitation of this equipment.

All test procedures detailed within this report are complete. The results in this report relate only to those items tested. If any additional information or clarification of this report is required, please contact us. This test report shall not be reproduced except in full, without the written approval of Trace Laboratories, Inc.

Thank you for selecting Trace Laboratories, Inc. for your testing requirements.

Michael Allison
Engineer

Attachment(s): Equipment Used List

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EQUIPMENT USED

Trace ID	Manufacturer	Equipment Name	Serial / Model Number	Calibration Date	Calibration Due Date
CH-14	Thermotron	Dual Thermal Shock Chamber	ATS-320-V-10-705-LN2/23937	29-Jan-10	29-Jan-11
CH-12	Blue M	Environmental Chamber	CFR-017/CFR-7552C-1	18-Oct-10	18-Oct-11
E-06	Hewlett-Packard	Q-Meter/Inductors	1839J03752/4342A	16-Apr-10	16-Apr-11
D-44	Mitutoyo	Digimatic Micrometer	1212516/227-211	28-Jan-10	28-Jan-12
E-71	Hipotronics	Hi-Pot Tester	P0806593/260-A	08-Jun-10	08-Jun-11
E-60	Hewlett-Packard	High Resistance Meter	JP1KD00570/4339B	19-Oct-10	19-Oct-11