MINCO

Test Report No. 2013

BELLCORE GR-1221 TESTING

REVISIONS

REV	DESCRIPTION	DATE	ECO	APP

		Date	Signature
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MINCO
PRODUCTS, INC.
CAGE Ident. No. 09359

A. SCOPE

Minco heaters have extensive history in meeting aerospace and medical specifications. In response to increasing applications in the telecommunications industry, we built and tested sample heaters to Bellcore GR-1221-CORE Generic Requirements for Passive Optical Components.

B. GENERAL INFORMATION

1. We tested heaters with our two primary insulations: polyimide and silicone rubber. The silicone rubber heater was a basic catalog heater. The polyimide heater was designed with the following construction options likely or expected for telecommunication applications:

   - Polyimide and silicone rubber insulation.
   - Heaters with lead wires attached to the heater under the cover.
   - Heaters with lead wires attached to the heater through access holes in the cover with the attachment area insulated by epoxy.
   - Heaters with bare metal pins or fingers (welded or brazed) instead of insulated lead wires.
   - Heaters with exposed surface-mounted thermistors.
   - Heaters with bead-type thermistors under the cover.

2. To simulate heat sink attachment, we adhered two .003” (0.08 mm) thick aluminum backing strips to the test heaters using two different pressure sensitive adhesives (PSA): .002” (0.05 mm) thick acrylic PSA and .001” (0.03 mm) thick silicone PSA onto .003” (0.08 mm) thick aluminum foil backing, pre-laminated onto the test heaters.

3. Minco performed the following tests from Table 4-2: Mechanical Shock, Vibration, High Temperature Storage (dry), High Temperature Storage (damp) or Damp Heat (Non-Hermetic), Low Temperature Storage, Temperature Cycling, and Cyclical Moisture Resistance. The more extreme uncontrolled environment (UNC) tests were done rather than the less-stringent Central Office environment (CO) tests.

4. We verified successful completion of each test using our general heater visual and electrical inspection criteria. We inspected each test heater under 20x magnification to ensure there was no delamination or any other mechanical damage resulting from the test. We measured the electrical resistance of each test heater at room temperature and each sensor in a 25°C bath and performed a 1000 Volts AC pass/fail dielectric test on each test heater.

5. There was no measurable or detectable change or damage to any of the test heaters resulting from any of the tests. On the before and after resistance measurements the degree of change was well within typical measurement accuracy.

6. If more detailed information is required, please contact Minco Sales at 763-571-3121.

C. MECHANICAL INTEGRITY TESTING AND RESULTS

1. Mechanical Shock Test per MIL-STD-883, Method 2002

a. Test Conditions and Description of Samples

Eleven polyimide and four rubber heater samples were bonded to a 1" thick aluminum shaker plate using .002” (0.05 mm) thick acrylic PSA. The rubber heaters were already vulcanized to aluminum plates which were then PSA-bonded to the shaker plate.

b. Test Results

Each test heater passed this portion of the test. See paragraphs B.4 through B.6.

2. Vibration Test per MIL-STD-883, Method 2007

a. Test Conditions and Description of Samples

See paragraph C.1.a. We used the same samples for both the shock and vibration tests.

b. Test Results

Each test heater passed this portion of the test. See paragraphs B.4 through B.6.

3. Thermal Shock Test

Test not performed because it is only required for hermetic devices.

4. Solderability Test

Test not performed because solderability is not applicable to our heater designs.

5. Fiber Integrity Test

Test not performed because no optical fibers are used in our heater designs.

D. ENDURANCE TESTING AND RESULTS

1. High Temperature Storage (dry) Test

a. Test Conditions and Description of Samples

The test heaters were put into an 85°C (185°F) oven for 2000 hours with room temperature resistance measurements taken at 168, 500, 1000 and 2000 hours.

b. Test Results

Each test heater passed this portion of the test. See paragraphs B.4 through B.6.

2. High Temperature Storage (damp) or Damp Heat (Hermetic) Test

Test not performed because our heaters are not hermetically sealed devices.

3. High Temperature Storage (damp) or Damp Heat (Non-Hermetic) Test

a. Test Conditions and Description of Samples

The test heaters were placed in a humidity chamber at 85°C and 85% humidity for 2000 hours. Data was taken at start and finish.

b. Test Results

Each test heater passed this portion of the test. See paragraphs B.4 through B.6.

4. Low Temperature Storage Test

a. Test Conditions and Description of Samples

The test heaters were put into a -40°C oven for 2000 hours with room temperature resistance measurements taken at 168, 500, 1000 and 2000 hours.

b. Test Results

Each test heater passed this portion of the test. See paragraphs B.4 through B.6.

5. Temperature Cycling Test per MIL-STD-883, Method 1010

a. Test Conditions and Description of Samples

The test heaters were cycled between -40°C and +85°C ovens with at least a 15-minute dwell time at the extremes for 500 cycles.

b. Test Results

Each test heater passed this portion of the test. See paragraphs B.4 through B.6.

6. Cyclical Moisture Resistance Test per MIL-STD-883, Method 1004

a. Test Conditions and Description of Samples

The test heaters were subjected to five 24-hour cycles, each with five subcycles and a sub-zero subcycle with 85%-95% humidity at 75°C and uncontrolled at 25°C and -40°C.

b. Test Results

Each test heater passed this portion of the test. See paragraphs B.4 through B.6.

E. SPECIAL TESTING AND RESULTS

1. Internal Moisture Test

Test not performed because our heaters are not hermetically sealed devices.

2. ESD Test

Test not performed because our heaters are not sensitive to static.