



Introduction to Filter Connectors

Space Grade Applications, Soldering and Lightning Strike

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Space Grade Applications

Nonmetallic materials such as rubber, plastic, adhesives and potting compounds can give off gasses when subjected to a vacuum or high heat. For space grade applications, Glenair is able to offer both both an 8 hour 400° bakeout process as well as a 24 hour 125° thermal vacuum outgassing process to insure our filter connector products do not give off gaseous molecules that might harm sensitive optical or electronic equipment.

The space industry has adopted a standardized test procedure, ASTM E 595, to evaluate outgassing properties of products that contain polymer materials. In the ASTM test, material samples are heated to 125° C at a vacuum of 5×10^{-5} torr for 24 hours. The test sample is then weighed to calculate the Total Mass Loss (TML), which may not exceed 1.00% of the total initial mass. Likewise the quantity of outgassed matter is weighed to determine the Collected Volatile Condensable Material (CVCM), which may not exceed 0.10% of the original specimen mass.

Glenair routinely performs both bakeout and thermal vacuum outgassing procedures on connector products that must conform to NASA screening or other outgassing standards. Our experience has been that the simpler bakeout process is more than adequate to meet the ASTM E 595 benchmark of 1.00% TML and 0.10% CVCM. Glenair is well versed in supplying filter connector products that are optimized for use in space grade applications, and we supply filter connectors compliant to EEE-INST-002, Table 2G, the recognized standard for spacegrade filter connectors.

Soldering

Our filter connector engineers are frequently asked about any special handling procedures that are required when soldering PC Tail and Solder-cup contacts. At issue is the potential to damage filter elements due to the high heat of the soldering process. The short answer is that any trained and qualified operator can complete the operation without any special precautions.

While it certainly can't hurt to take some basic precautions such as preheating the connector or utilizing a heat sink on individual contacts, our tests have revealed that, under normal conditions, the temperature of the ceramic filter array is not radically raised during solder termination of the contacts. Even in tests where we used a solder iron temperature of 350°C and an extremely long 'touch time' of 90 seconds, no adverse effects were observed. In fact, temperature at the ceramic remained well below 100°C at all times.

While special precautions are not required for soldering, filter connectors should be cleaned only in a mated condition. Use a metal protective cover to protect the filter connector's sensitive components from cleaning fluid. In addition, limit bakeout temperatures to +125 C.

Composite Connectors and Lightning Strike

Composite thermoplastic materials, such as the 30% glass filled polyetherimide (PEI) used in Glenair's MIL-DTL-38999 Series III Wall Mount Receptacle Connector (240-011) have been tested for mechanical and electrical survivability to direct and indirect lightning strike. At issue is the ability of the composite connector shell to maintain its electrical continuity in the event of an intense voltage surge resulting from lightning strike.

In testing in accordance with MIL-STD-1344, items are subjected to waveform 1 and 5B using a high current generator. Items must remain functional without degradation of the unit's electrical performance, including filtering elements and TVS diodes and modules. Waveform 1 and 5B are applied starting at 3kA increasing to 20kA checking continuity measurements at set intervals. Waveform 1 is additionally subjected to an oscillatory wave starting at 30kA and increasing in 10kA steps until failure in continuity is measured.

While larger composite connector shell sizes (12 to 24) conform to MIL-STD-1344, smaller sizes (8 and 10) fail the test. Customers should select alternative materials, aluminum or stainless steel, when specifying small connector shell sizes in applications subject to lightning strike.