REQUIREMENT 14

DETAILED REQUIREMENTS FOR FEED-THROUGH FILTERS

14. General. This section describes detailed requirements for a DPA of commonly used filters. These requirements supplement the general requirements in section 4. Examples of typical configuration sketches are included. When applicable, specification numbers or types are referenced to assist in identification. Pre-DPA tests such as functional tests and solderability tests are assumed to have been satisfied by normal inspection and testing and are therefore not addressed.

14.1 Filters, EMI, low pass, feed-through (MIL-PRF-15733 and MIL-PRF-28861). Typical configurations are illustrated on figures 14-1, 14-2, and 14-3. These devices are typically installed in a metal can with a glass-to-metal (hermetic) seal either with or without internal potting resin.

14.1.1 Method.

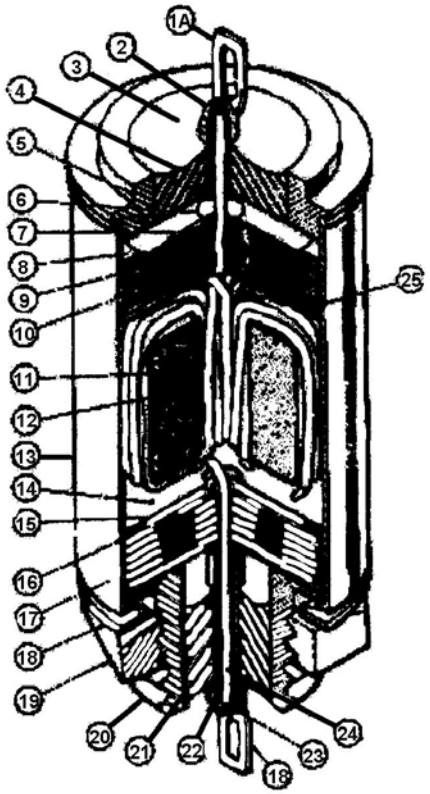
14.1.1.1 External visual. Conduct visual examination at 20X minimum magnification. Record variances in configuration, and defects in end seals, terminals, and leads.

14.1.1.2 Hermeticity. If not accomplished during receiving inspection, verify seal integrity in accordance with the requirements of the procurement specification.

14.1.1.3 Sample preparation. Sample preparation shall be in accordance with the requirements of MIL-PRF-28861. Review X-ray negatives prior to sample preparation, for internal component location and/or anomalies that can be highlighted during cross-sectioning.

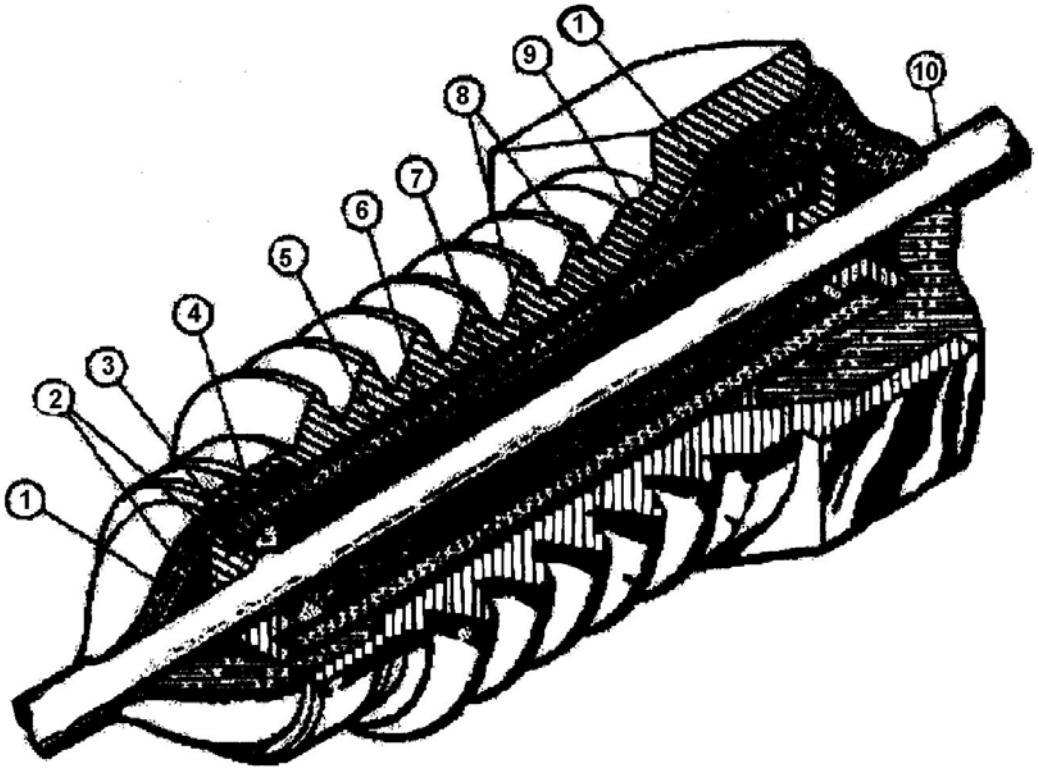
14.1.1.4 Internal visual. Encapsulate all but one device in clear epoxy. Cross-section one half of the encapsulated devices (round up) in a plane parallel to the longitudinal axis of the device to the center point. The remaining encapsulated devices will be sectioned in a plane(s) transverse to the longitudinal axis of the device into the center point of all discoidal capacitors inside the device.

14.1.1.5 Chemical decapsulation. In the event cracks in the ceramic of the discoidal capacitor(s) are noted in the sectioned devices which are considered rejectable, the remaining unsectioned device shall be subjected to chemical decapsulation to expose the outer surfaces of the discoidal capacitor(s) for examination without the introduction of the stresses of cross-sectioning. The purpose of this test is to verify the findings at cross-sectioning. The outer metal case shall be immersed in a solution of 1:1 hydrochloric acid and nitric acid until it is completely dissolved and exposes the inner assembly of the device. If epoxy staking material is present within the device and attached to the discoidal capacitor(s), immerse the remaining assembly in fuming nitric acid until the epoxy is digested. This should expose the capacitor elements with the center feedthrough wire still soldered in place. Inspect the exposed surfaces of the capacitor(s) for cracks which would be similar to those noted in sectioning. Continued exposure to the 1:1 hydrochloric acid and nitric acid will further attack the center feedthrough solder and wire allowing for exposure of cracks within the center feedthrough hole. Care must be taken as the electrode plates within the capacitor(s) may also be attacked, and if subjected to attack too long, will allow for innerlayer dielectric separation of the capacitors. Inspect the inner feedthrough and exposed surfaces of the capacitor(s) for cracks as applicable to confirm previous cross-section results. If cracks are not detected, encapsulate the decapsulated discoidal capacitor(s) and cross-section along the feedthrough hole axis to midpoint and inspect for cracks similar to those detected at prior sectioning.



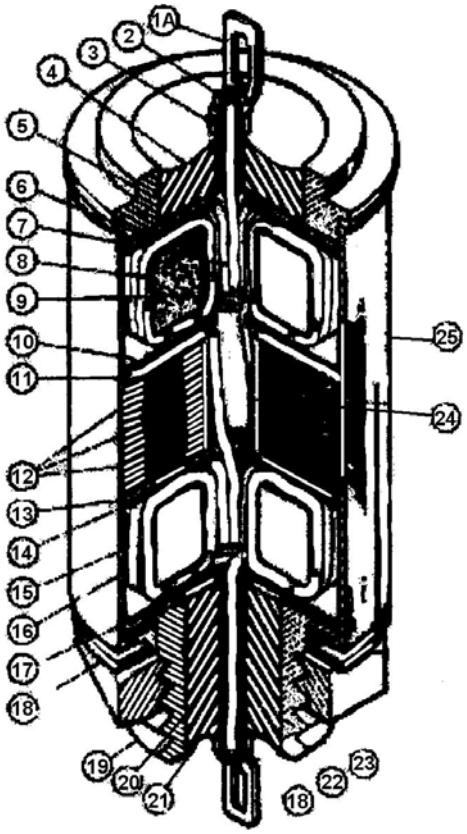
ITEM	ITEM NAME	MATERIALS OF CONSTRUCTION
1	Flag Terminal	Alloy 52
2, 23	Solder	20 percent Sa, 77 percent Pb, 3 percent Ag
3, 22	Terminal Extensions	Alloy 52
4, 21	Seal	Glass
5	Outer Flange	Gold Rolled Steel #1113
6, 9, 15	Solder	60 percent Sa, 33 percent Pb, 2 percent Ag
7	Eyelet	Tin Plated Brass
8, 16	Split, Ring	Tin Plated Brass
10, 17	Capacitor	Ceramic Capacitor (Proprietary Composition)
11	Core Coating	Enamel
12	Core	MTP-112 Moly-Permalite
13	Can	Ledloy “A”
14, 25	Washer	Mica
18	Lock Washer	Tin Plated Phosphor Bronze
19	Max Nut	Tin Plated Brass
20	Seal (threaded)	Ledloy “A”
24	Coil Wire	Annealed Copper

FIGURE 14-1. Typical ferrite bead EMI filter.



ITEM	ITEM NAME	MATERIALS OF CONSTRUCTION
1	Potting	Proprietary
2	Solder	60 percent Sn, 38 percent Pb, 2 percent Ag
3	Clip	Silver plated free machining Brass
4	Void	
5		Conductive Silver Epoxy
6	Ceramic	Doped Barium Titinate
7	Ferrite Bead	Ni/Zn Ferrite
8	Electrode	Silver parts, 95 percent Silver in a frit mixture
9	Bushing	Silver plated C12L15 Carbon Steel or free machining Brass
10	Terminal	Silver Plated 1/2 hard Copper Wire

FIGURE 14-2. Typical "P" section EMI filter.



ITEM	ITEM NAME	MATERIALS OF CONSTRUCTION
1	Flag Terminal	Alloy 52
2, 22	Solder	20 percent Sn, 77 percent pb, 3 percent Ag
3, 21	Terminal Extension	Alloy 52
4, 20	Seal	Glass
5	Outer Flange	Cold Rolled Steel No. 1113
14, 6		
10, 17	Washer	Mica
7, 23	Coil Wire	Annealed Copper
8, 15	Core Costing	Enamel
9, 16	Core	MPP-112 Moly-Permalite
11, 13	Split Ring	Tin Plated Brass
12	Capacitor	Ceramic Capacitor (Proprietary composition)
18	Lockwasher	Tin Plated Phosphor Bronze
19	Seal (threaded)	Ledloy ”A“
23	Can	Ledloy “A”

FIGURE 14-3. Typical "T" section EMI filter.

14.1.2 Data records. DPA findings that deviate from the specified configurations or other requirements shall be documented as defects.

14.1.3 Evaluation criteria. When the DPA is being conducted as a lot conformance test, the associated production lot shall be rejected if one or more of the DPA sample parts exhibit any of the defects listed below (as applicable to the type of part being examined).

a. Seal leakage in excess of specification requirements.

b. Cracks or chips on the glass seal that are not polishing artifacts.

c. Voids in potting that permit movement of internal components or that exceed specification requirements.

d. Cracks or voids in ceramic capacitors that exceed the requirements described in 10.1 herein.

e. There shall be no solder balls or other foreign material lodged internally.

f. Ceramic discoidal capacitors that do not have a minimum of 240 degrees of their circumferential surface area soldered or silver epoxy attached uniformly to the inner surface of the case, as can be seen on the X-ray negatives, or in cross-section.

g. Misalignment of the capacitive or inductive element with the case that is greater than 10 degrees.

h. Solder used for internal connections does not meet the melting temperature requirements of the procurement specification.

i. Any cracked or cold solder connection, internally or externally.

j. For filters with wound inductors, the wire and core used do not meet the requirements of the procurement specification.

k. Inductor cores that are chipped or cracked; also inductor wire that is broken, nicked, necked down, or does not meet specification requirements, including cracked or broken ferrite elements.

l. Wiring junction splices, if any, do not have joint integrity and insulation.

m. Egress of leads through the eyelet or tubulet not soldered for a minimum of 50 percent of the tube length, or the solder is cracked away from the inside of the eyelet or from the wire.

n. External tab terminals not coated in accordance with the procurement specification.

o. Inductor wire not insulated from the case and the core.

p. Resin filler shows separation from the case or from the lead wires.

q. Any defect that reduces part reliability.

r. Less than 20 percent (average both sides of feedthrough) solder or silver epoxy attach of the capacitor feedthrough conductor to the capacitor in cross-section.

s. No stress relief on inductor wire, especially when combined with silicone-type filler.

t. Presence of pure tin (Pure tin defined as less than 3 percent alloy element).

u. Excessive flux residue. Flux residue bridging the opposing polarity is not acceptable.