



JOHANSON DIELECTRICS INC.

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Johanson Ceramic Capacitors Forward/Backward Process Compatibility

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The standard termination finish for Johanson ceramic capacitors is matte tin over nickel. Tin lead (SnPb) plating is available on special and is typically supplied for aerospace and other high reliability industries that require lead (Pb) in the termination finish.

The questions that can arise is can matte tin plated over nickel be soldered with standard SnPb solder profiles. Matte tin on the termination is rapidly dissolved into either SnPb or lead free (LF) solder alloys forming a reliable solder joint. The solder joint is formed between the solder alloy and base metal on the capacitor termination and requires no change in solder profiles. The following is a set of general soldering guidelines for termination finishes and solder alloys and is summarized in Table 1.

- 1) Lead free termination finish components are compatible with both LF and Pb bearing solder
- 2) Components using Pb bearing lead finish are not compatible with LF reflow solder assemblies and can poison or contaminate LF solder pots.
 - a. A thin Pb bearing zone forms near the lead containing Pb during reflow soldering and freezes later than bulk of the solder joint
 - b. At this point all of the shrinkage stress is concentrated in the thin Pb zone and can result in solder joint cracks
- 3) Pb bearing subassemblies are compatible with LF soldering temperatures
- 4) LF subassemblies are usually not compatible with standard Pb based solder reflow profiles due to degradation of LF solder joints (See ** below)

Table 1. Lead Finish Solder Process Compatibility

Component Lead Finish	SnPb Reflow Process (Tin Lead)	LF Reflow Process (Lead Free)
Pb Bearing Component Leads or SnPb Soldered Subassembly	Yes	Yes*
Lead Free Finish	Yes	Yes
Lead Free Sub Assembly	No**	Yes

* Depending on reflow solder time and peak temperatures tin lead solder will mix with lead free solder resulting in an intermediate lower temperature alloy near the Pb bearing lead or termination.

** Lead free solder joints may reach the solders melting point resulting in very weak joints, complex heat sinking and or shields will be required. This is due to different phases forming that can have slightly different melting/freezing points that can form small cracks within the solder joint during cool down.



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