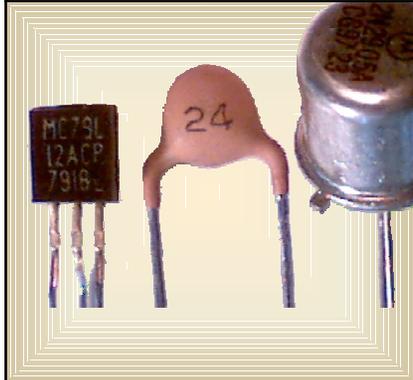


**THROUGH-HOLE SOLDERING
PREPARATION OF CONDUCTORS**

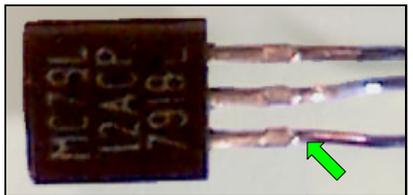


PREPARATION OF CONDUCTORS

The quality of solder terminations can be correlated to the preparation of the conductors prior to soldering.

Solderability can be significantly improved by the pre-tinning and thorough cleaning of all surfaces designated to be part of the completed solder termination. Pre-forming of component leads and other conductors reduces stresses in the solder joint and component body.

See Section 6.01 "Through-Hole Soldering, General Requirements", for common accept / reject criteria.



**PREFERRED
COMPONENT LEADS**

The component's leads have been tinned, formed, and cleaned per engineering requirements. Gold plating has been removed. The spacing and radius of bends are within requirements. There is no mechanical damage to the component leads or body.



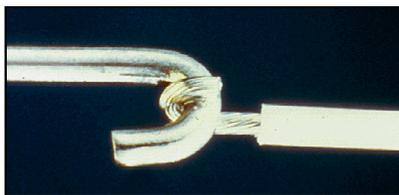
**PREFERRED
CONDUCTORS / WIRE**

The conductors have been stripped, tinned, formed, and cleaned per engineering requirements. There is no mechanical damage to the conductor or insulation, no reduced cross-section, and individual strands are discernable.



**PREFERRED
TERMINATION AREAS / PWB**

Termination areas have been tinned with hot-coated tin-lead solder or hot reflowed electro-deposited tin-lead solder prior to mounting of the parts. Gold plating has been removed.



**PREFERRED
TERMINATIONS / MISCELLANEOUS**

The terminations have been properly tinned, formed, and cleaned in preparation for solder termination. The preparation of simple terminations, such as the hook and conductor termination shown, is just as important as more complex terminations.

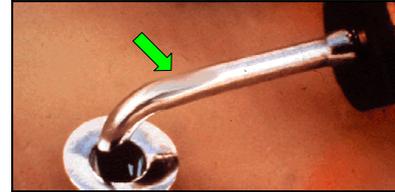
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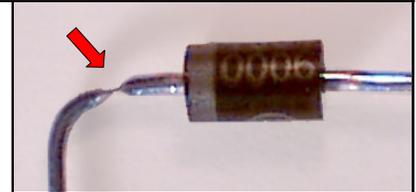
**THROUGH-HOLE SOLDERING
PREPARATION OF CONDUCTORS (cont.)**



**ACCEPTABLE
LEAD FORMING - SMOOTH TOOL MARKS**

Smooth tool impression marks resulting from tool holding forces are acceptable, provided they do not expose base metal or reduce cross-sectional area.

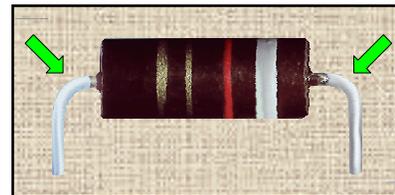
[NASA-STD-8739.3 \[7.2.3 \], \[8.1.6.d \]](#)



**UNACCEPTABLE
REDUCED CROSS-SECTIONAL AREA**

Part leads and other conductors that have deformation / damage resulting in a reduced cross-sectional area shall not be used.

[NASA-STD-8739.3 \[7.2.3 \], \[8.1.6.d \]](#)
[NASA-STD-8739.4 \[10.1.3 \]](#)



**ACCEPTABLE
PREFORMING / SIZING**

Part leads shall be formed so that they may be installed into the holes in the PWB without excessive deformation that can stress the part body or end seals. All leads should be tinned and formed prior to mounting.

[NASA-STD-8739.3 \[8.1.6.b \], \[8.1.6.c \]](#)



**UNACCEPTABLE
IMPROPER PREFORMING / SIZING**

Part leads shall be formed so that they may be installed into the holes in the PWB without excessive deformation that can stress the part body or end seals.

[NASA-STD-8739.3 \[8.1.6.b \], \[8.1.6.c \]](#)



**ACCEPTABLE
TINNING - COVERAGE**

The portion of stranded or solid conductors, or part leads shall be solder tinned and cleaned prior to attachment. The solder shall completely wet the conductor and exhibit 100% coverage.

[NASA-STD-8739.3 \[7.2.5 \], \[7.2.6 \]](#)
[NASA-STD-8739.4 \[10.1.5 \]](#)



**UNACCEPTABLE
IMPROPER TINNING (COVERAGE)**

The solder shall completely wet the conductor and shall exhibit 100% coverage.

[NASA-STD-8739.3 \[7.2.5 \], \[7.2.6 \], \[13.6.2.a.3 \]](#)
[NASA-STD-8739.4 \[10.1.5 \]](#)

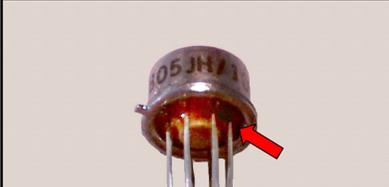
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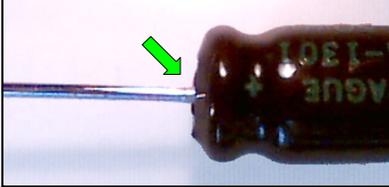


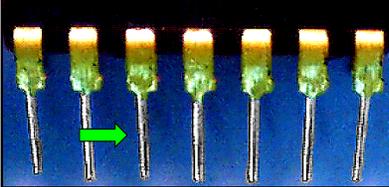
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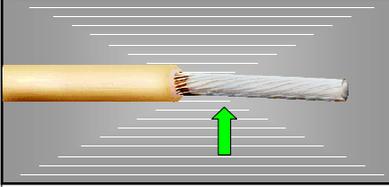
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**THROUGH-HOLE SOLDERING
PREPARATION of CONDUCTORS (cont.)**

	
<p>ACCEPTABLE TINNING – DIMENSIONS</p> <p>Hot tinning of solid conductors and part leads shall not extend closer than 0.5 mm (0.020 in.) to part bodies, end seals, or insulation, unless the part configuration and mounting configuration dictate.</p> <p>NASA-STD-8739.3 [7.2.5.a]</p>	<p>UNACCEPTABLE IMPROPER TINNING (SPACING)</p> <p>The tinning has extended closer than 0.5 mm (0.020 in.) to the part body / lead seals, and may have compromised the hermetic seal.</p> <p>NASA-STD-8739.3 [7.2.5.a], [13.6.2.a.3]</p>


<p>ACCEPTABLE TINNING – DIMENSIONS (SPECIAL EXEMPTION)</p> <p>In instances where conductor tinning is required to be closer than 0.5 mm (0.020 in), the part body, end seals, or insulation shall be inspected for damage and results recorded.</p> <p>NASA-STD-8739.3 [7.2.5.a]</p>

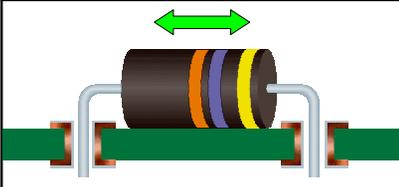

<p>ACCEPTABLE TINNING - GOLD REMOVAL</p> <p>Gold plating on all surfaces that become part of finished solder connections shall be removed by two successive tinning operations, or by other approved processes.</p> <p>NASA-STD-8739.3 [7.2.5.c]</p>


<p>ACCEPTABLE TINNING - STRANDED WIRE</p> <p>The solder shall completely wet the conductor, penetrate to the inner strands, and exhibit 100% coverage. Wire strands shall be distinguishable. Wicking of flux or solder shall be minimized.</p> <p>NASA-STD-8739.3 [7.2.5], [7.2.6] NASA-STD-8739.4 [10.1.5]</p>

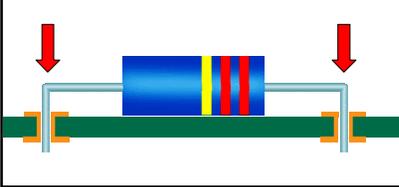

<p>UNACCEPTABLE DAMAGED INSULATION</p> <p>After stripping and tinning, the conductor insulation shall not exhibit any damage, such as nicks, cuts, or charring. Conductors with damaged insulation shall not be used.</p> <p>NASA-STD-8739.3 [13.6.2.a.1] NASA-STD-8739.4 [19.6.2.a.2]</p>

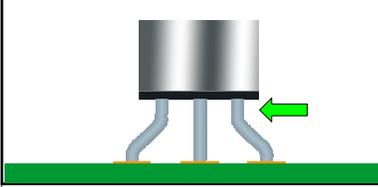
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**THROUGH-HOLE SOLDERING
PREPARATION of CONDUCTORS (cont.)**

	
<p>ACCEPTABLE COMPONENT CENTERING</p> <p>The component leads shall be bent such that the distance from the bend to the end seal shall be approximately equal at each end of the part, resulting in the centering of the part between the mounting holes.</p> <p>NASA-STD-8739.3 [8.1.6.a]</p>	<p>UNACCEPTABLE IMPROPER CENTERING</p> <p>The component leads shall be bent such that the distance from the bend to the end seal shall be approximately equal at each end of the part, resulting in the centering of the part between the mounting holes.</p> <p>NASA-STD-8739.3 [8.1.6.a], [13.6.2.a.5]</p>


<p>ACCEPTABLE LEAD FORMING - BEND RADIUS</p> <p>The radius of bends in the conductor shall not be less than the lead diameter or lead thickness.</p> <p>NASA-STD-8739.3 [8.1.6.a]</p>


<p>UNACCEPTABLE IMPROPER BEND RADIUS</p> <p>The radius of bends in the conductor shall not be less than the lead diameter or lead thickness.</p> <p>NASA-STD-8739.3 [8.1.6.a], [13.6.2.a.10]</p>


<p>ACCEPTABLE LEAD FORMING - BEND SPACING</p> <p>The minimum distance from the part body or seal to the start of the bend in a part lead shall be a minimum of 2 lead diameters for round leads, and 0.5 mm (0.020 in.) for ribbon leads.</p> <p>NASA-STD-8739.3 [8.1.6.a]</p>


<p>UNACCEPTABLE IMPROPER LEAD / BEND SPACING</p> <p>The minimum distance from the part body, seal, or weld bead to the start of the bend in a part lead shall be a minimum of 2 lead diameters for round leads, and 0.5 mm (0.020 in.) for ribbon leads.</p> <p>NASA-STD-8739.3 [8.1.6.a], [13.6.2.a.15]</p>

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**THROUGH-HOLE SOLDERING
PREPARATION OF CONDUCTORS (cont.)**



**ACCEPTABLE
TINNING - TERMINALS / SOLDER CUPS**

Terminals and solder cups shall be solder tinned, examined for damage, and cleaned prior to the attachment of conductors.

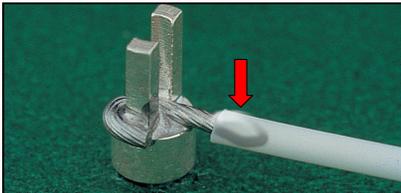
[NASA-STD-8739.3 \[7.2.5 \], \[7.3.1 \], \[7.3.2 \]](#)



**UNACCEPTABLE
DAMAGED CONDUCTOR – GENERAL**

After removal of the conductor insulation and/or lead forming, the conductor shall not be nicked, cut, or scraped to the point that base metal is exposed.

[NASA-STD-8739.3 \[13.6.2.a.8 \]](#)
[NASA-STD-8739.4 \[19.6.2.a.1 \]](#)



**UNACCEPTABLE
EXCESSIVE WICKING**

The use of flux and the solder-tinning operation shall be controlled to limit wicking under the insulation.

[NASA-STD-8739.3 \[7.2.5 \]](#)
[NASA-STD-8739.4 \[10.1.5 \]](#)

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