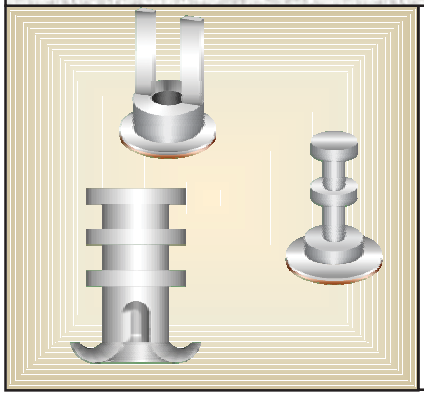
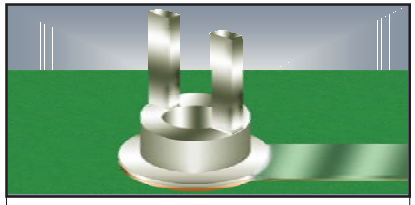
THROUGH-HOLE SOLDERING
MECHANICAL ASSEMBLY, SWAGED TERMINALS



TERMINALS

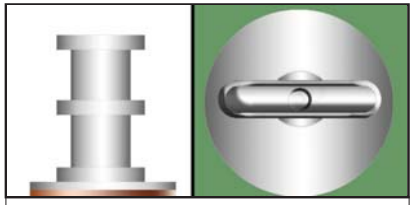
Terminals are generally restricted to applications requiring components to be routinely removed and replaced, such as in high-gain analog tuning circuits. The installation of terminals increases the vertical profile of the printed wiring assembly (PWA) significantly, requiring the designer to ensure minimum electrical spacing requirements are not violated.

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



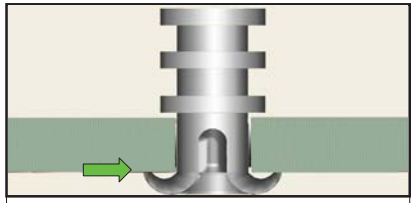
PREFERRED
BIFURCATED TERMINAL

The terminal is properly set, aligned, and straight. Tines are straight. No exposed base metal. Flange is swaged sufficiently tight to prevent Z-axis movement, while allowing finger force twisting for adjustment. No damage to the PWB.



PREFERRED
ELLIPTICAL FUNNEL SWAGE

The flange is uniformly shaped and concentric to the hole or termination pad. Strain / stress marks are minimum, no splits or cracks. Flange is swaged sufficiently tight to prevent Z-axis movement, while allowing finger force twisting for adjustment. No damage to the PWB.



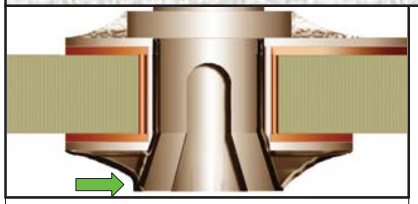
PREFERRED
ROLL FLANGE SWAGE

The flange is uniformly rolled and concentric to the hole or termination pad. Strain / stress marks are minimum, no splits or cracks. Flange is swaged sufficiently tight to prevent Z-axis movement, while allowing finger force twisting for adjustment. No damage to the PWB.

PREFERRED
TURRET TERMINAL

The terminal is properly set and straight. No exposed base metal. Flange is swaged sufficiently tight to prevent Z-axis movement, while allowing finger force twisting for adjustment. No damage to the PWB.

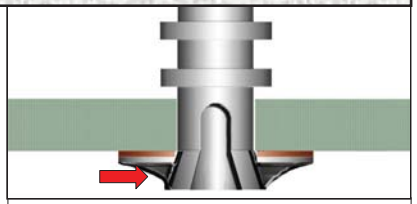
THROUGH-HOLE SOLDERING
MECHANICAL ASSEMBLY, SWAGED TERMINALS (cont.)



MANDATORY
SOLDER SIDE TERMINATION
V-FUNNEL SWAGE

Designs calling for soldering of the swaged end of the terminal to the printed wiring conductor on a single-sided PWB shall be secured with a V-funnel swage.

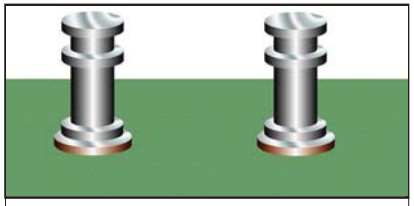
NASA-STD-8739.3 [8.2.3]



UNACCEPTABLE
IMPROPER SWAGE USED

Designs calling for soldering of the swaged end of the terminal to the printed wiring conductor on a single-sided PWB shall be secured with a V-funnel swage.

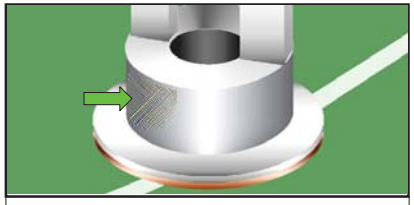
NASA-STD-8739.3 [13.6.2.a.14]



ACCEPTABLE
SWAGE SETTING

The terminal shall be swaged sufficiently tight to prevent Z-axis movement, while allowing finger force twisting for adjustment. Swaging shall not damage the PWB or the termination pad.

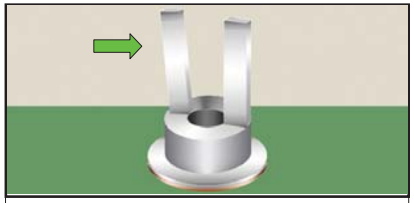
NASA-STD-8739.3 [8.2.1.a]



ACCEPTABLE
SMOOTH IMPRESSION MARKS

Smooth impression marks (base metal not exposed) resulting from tool holding forces shall not be cause for rejection.

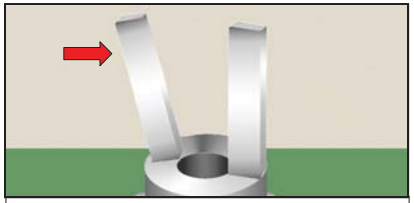
NASA-STD-8739.3 [7.2.3]



ACCEPTABLE
RADIAL ALIGNMENT
(BIFURCATED TERMINALS ONLY)

The terminal is slightly twisted out of radial alignment, but the alignment will not adversely affect component installation or strain relief.

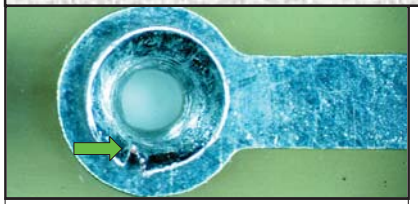
Best Workmanship Practice



UNACCEPTABLE
IMPROPER ALIGNMENT

Bifurcated terminals shall be aligned to allow the proper termination of leads or conductors.

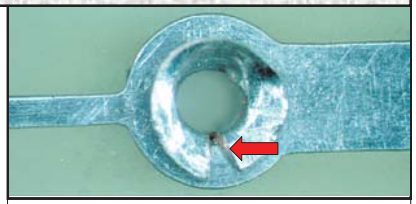
Best Workmanship Practice



ACCEPTABLE
RADIAL SPLITS / CRACKS

The rolled area or flange may have a maximum of 3 radial splits or cracks, which are separated by at least 90°, and/or which do not extend beyond the coiled or flared area.

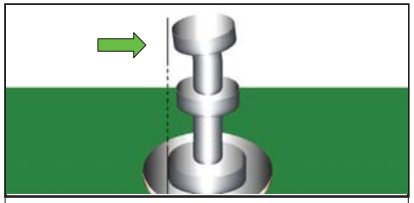
NASA-STD-8739.3 [8.2.1.b]



UNACCEPTABLE
RADIAL SPLITS / CRACKS

The rolled area or flange shall not have more than 3 radial splits or cracks, which are separated by less than 90°, and/or which extend beyond the coiled or flared area.

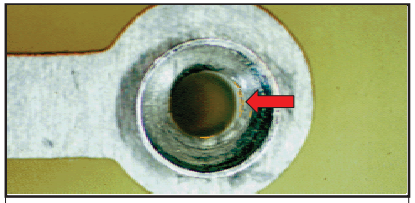
NASA-STD-8739.3 [8.2.1.b], [13.6.2.a.14]



ACCEPTABLE
VERTICAL MISALIGNMENT

The terminal is slightly bent, but the top edge does not extend beyond the base, and alignment will not violate minimum electrical clearance.

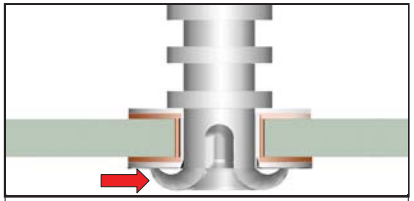
Best Workmanship Practice



UNACCEPTABLE
CIRCUMFERENTIAL SPLITS / CRACKS

After swaging or flaring, the rolled area or flange shall be free of circumferential splits or cracks.

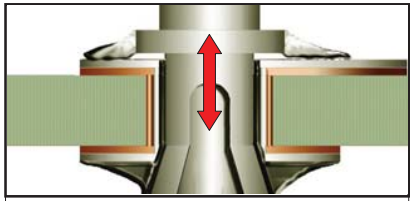
NASA-STD-8739.3 [8.2.1.b], [13.6.2.a.14]



UNACCEPTABLE
IMPROPER SWAGE USED

Roll swages shall not be used on plated-through holes.

NASA-STD-8739.3 [8.2.2]



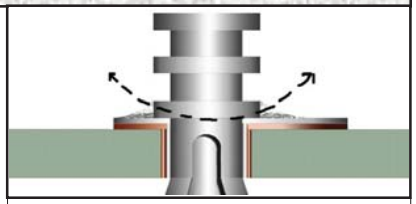
UNACCEPTABLE
INCOMPLETE SWAGE

The flange shall be swaged sufficiently tight to prevent movement in the Z-axis.

Best Workmanship Practice

PREFERRED
V-FUNNEL FLANGE

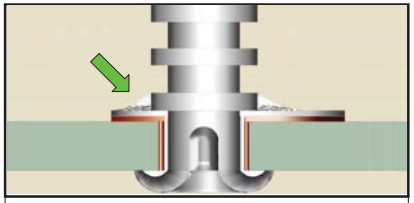
The flange is uniformly swaged and concentric to the hole / pad, and is sufficiently tight to prevent Z-axis movement, while allowing finger force twisting for adjustment.. Minimum stress marks, no splits or cracks. No damage to the PWB.



MANDATORY
ADJUSTABILITY

Terminals shall be swaged such that they can be rotated (twisted) under finger force.

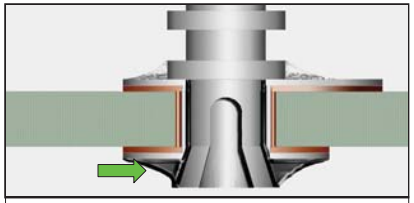
NASA-STD-8739.3 [8.2.4]



MANDATORY
COMPONENT SIDE TERMINATION
ROLL SWAGE

Swage type terminals in non-PTH's, designed to have the terminal shoulder soldered to the printed wiring conductor, shall be secured to the PWB by a roll swage.

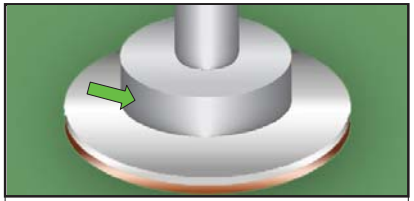
NASA-STD-8739.3 [8.2.2]



ACCEPTABLE
PLATED-THROUGH HOLE (PTH) TERM.
V-FUNNEL / ELLIPTICAL SWAGE

Terminals mounted in plated-through holes (PTH) shall be secured with a V-funnel or elliptical funnel swage. The elliptical funnel is preferred.

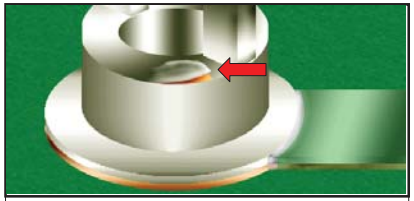
NASA-STD-8739.3 [8.2.4]



MANDATORY
PLATING

Terminals shall be copper; hot dipped, tin-lead coated, or hot reflowed, electrodeposited tin-lead solder. Finish shall be smooth and shiny.

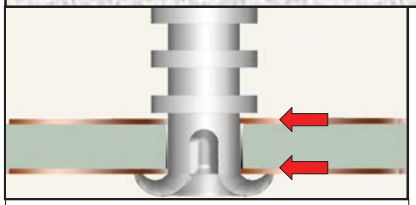
NASA-STD-8739.3 [9.1.12]



UNACCEPTABLE
PLATING DEFECTS

Flaking or peeling plating shall be grounds for rejection.

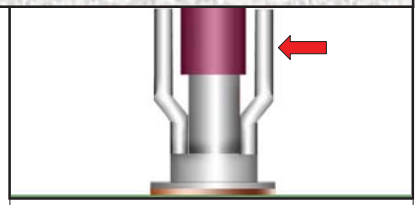
Best Workmanship Practice



UNACCEPTABLE
INTERFACIAL CONNECTIONS

Terminals shall not be used as interfacial connections in non-plated through holes.

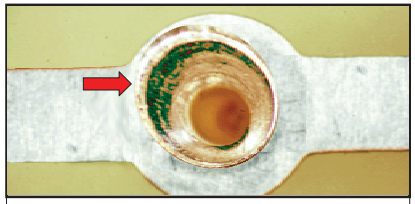
NASA-STD-8739.3 [8.2.1.a], [13.6.2.a.14]



UNACCEPTABLE
MODIFICATIONS

Terminals shall not be modified to accommodate improper conductor sizes.

NASA-STD-8739.3 [7.3.2], [13.6.2.a.19]



UNACCEPTABLE
NONCONCENTRIC SWAGE

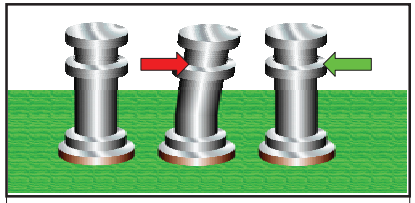
The swage shall be set approximately concentric to the hole and/or termination pad.

Best Workmanship Practice

UNACCEPTABLE
PWB DAMAGE

The terminal has been swaged to the point that the substrate has been fractured and glass fiber is exposed.

NASA-STD-8739.3 [8.2.1.a]



UNACCEPTABLE
TERMINAL DAMAGE

Terminals exhibiting physical damage (i.e.: nicks, gouging, bent / missing tines, reduced cross-section, etc.) shall be rejected.

Best Workmanship Practice

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