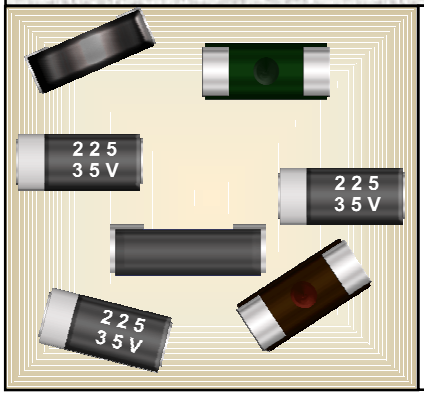
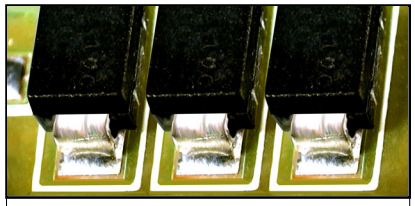


INWARD-FORMED "L" LEAD PACKAGES

Inward-formed "L" lead packages have leads that are formed in a configuration very similar to the outline of the letter "L", with the lead bent underneath the component package.

The "L" lead configuration is a shortened (both length and height) version of the "Gull-Wing" and the leads tend to be much stiffer, reducing co-planarity / planarity problems and offering a smaller "footprint".

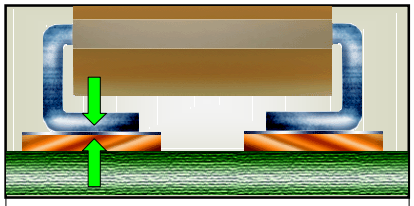
See Section 7.01 "Surface Mount Soldering, General Requirements", for common accept / reject criteria.



PREFERRED

The parts are properly oriented to the land pattern, with each lead centered across the width of the land. Leads are planar and fully wetted, fillets are shiny and concave, and heel fillet is evident.

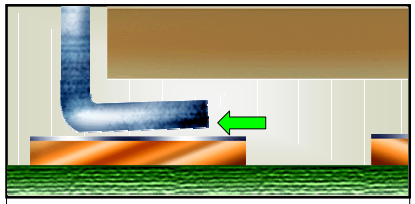
NASA-STD-8739.2 [8.7.4.j], [12.6.2], [12.8], [12.9.4]



PREFERRED
COPLANARITY

The lead's foot should be parallel to, and in full contact with the termination pad.

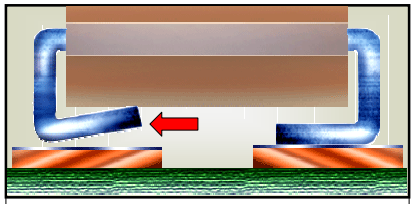
NASA-STD-8739.2 [7.1]



ACCEPTABLE
COPLANARITY

The maximum acceptable variation in planarity between any portion of the lead foot and the termination pad shall not exceed 0.26 mm (0.010").

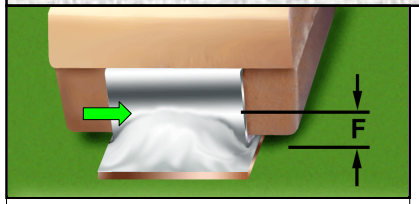
NASA-STD-8739.2 [7.1], [12.8.1.h]



UNACCEPTABLE
IMPROPER COPLANARITY

Excessive non-planarity may result in open or mechanically weak solder terminations, excessive part tilt, solder contact with the component body, or violate minimum electrical spacing requirements.

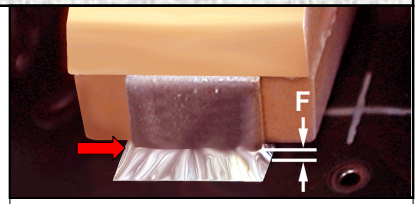
NASA-STD-8739.2 [12.8.2.a.10]



ACCEPTABLE
MINIMUM HEEL FILLET HEIGHT (F)

The heel fillet height (F) shall be sufficient to produce a fully wetted, concave fillet.

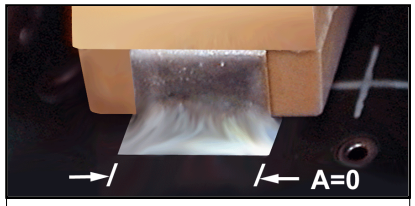
NASA-STD-8739.2 [12.9.4]



UNACCEPTABLE
INSUFFICIENT HEEL FILLET HEIGHT (F)

The termination does not exhibit a fully wetted, concave heel fillet.

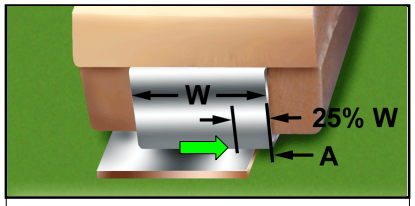
NASA-STD-8739.2 [12.9.4]



PREFERRED
LATERAL / SIDE OVERHANG (A)

The target condition is no lateral / side overhang (A), with the component leads centered on the termination lands / pads.

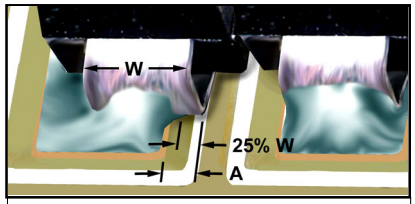
NASA-STD-8739.2 [8.7.4.j], [12.6.2], [12.8.1.h]



ACCEPTABLE
LATERAL / SIDE OVERHANG (A)

The component lead is overhanging the termination pad by less than 25% of the lead width (W), and the overhang condition does not violate minimum electrical spacing requirements.

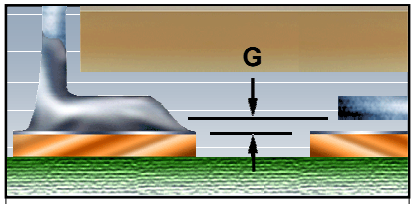
NASA-STD-8739.2 [12.6.2.6], [12.9.4]



UNACCEPTABLE
IMPROPER LATERAL / SIDE OVERHANG (A)

Lateral / side overhang (A) shall not exceed 25% of the lead width (W), and shall not violate minimum electrical spacing requirements.

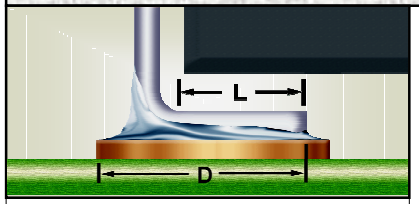
NASA-STD-8739.2 [12.9.4.b.1]



PREFERRED
SOLDER THICKNESS (G)

The solder thickness shall be sufficient to form a properly wetted, concave fillet which extends over the complete periphery of the connection.

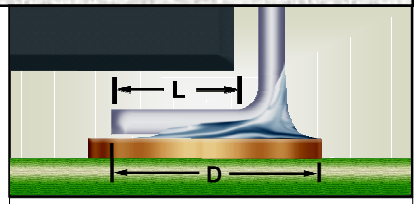
NASA-STD-8739.2 [12.8.1.b], [12.9.4.a]



ACCEPTABLE
SIDE JOINT FILLET (D)

The side joint fillet shall be present, equal to the lead length (L) plus the heel fillet, and exhibit a positive contour.

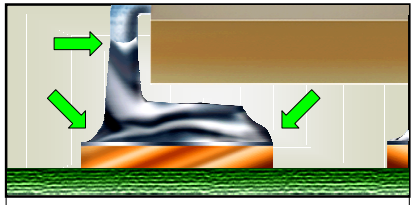
Best Workmanship Practice



UNACCEPTABLE
IMPROPER SIDE JOINT FILLET (D)

A side joint fillet less than 75% of the lead length (L) plus the heel fillet, or that exhibits flow lines is an indicator of a process problem.

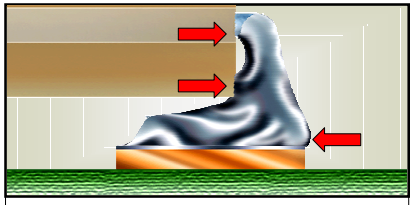
Best Workmanship Practice



ACCEPTABLE
MAXIMUM SOLDER

Solder quantity is at maximum, but does not contact the component body, or extend into the upper lead bend. The connection is well wetted, with a concave fillet between the lead and the land, and the lead contour is visible.

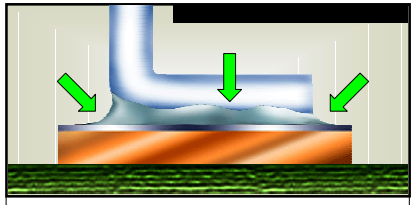
NASA-STD-8739.2 [12.8.1], [12.9.4.a]



UNACCEPTABLE
EXCESS SOLDER

Solder has contacted the component body on the inside of the lead bend, extending beyond 75% of the lead height into the upper lead bend, and exhibits a convex fillet.

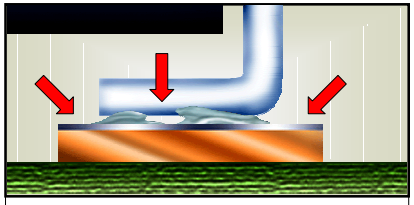
NASA-STD-8739.2 [12.8.2.b.16], [12.9.4.b.3]



ACCEPTABLE
MINIMUM SOLDER

Solder quantity is minimum, with a concave heel fillet evident. The solder has completely wetted all elements of the termination, and extends to the periphery of the termination pads.

NASA-STD-8739.2 [12.8.1.b], [12.9.4.a.1]

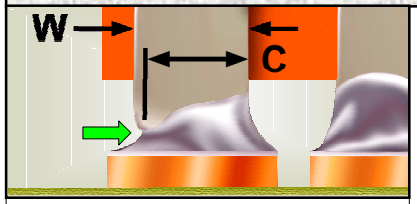


UNACCEPTABLE
INSUFFICIENT SOLDER

The solder quantity was not sufficient to form a properly wetted fillet to all portions of the component termination or extend to the land edges.

NASA-STD-8739.2 [12.8.2.b.6], [12.9.4.b.4]

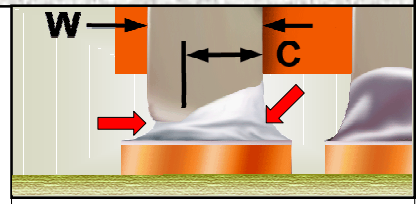
SURFACE MOUNT TECHNOLOGY (SMT)
INWARD-FORMED "L" LEAD PACKAGES (cont.)



ACCEPTABLE
END JOINT WIDTH (C)

The width of the end joint (C) shall be greater than or equal to 75% of the lead width (W).

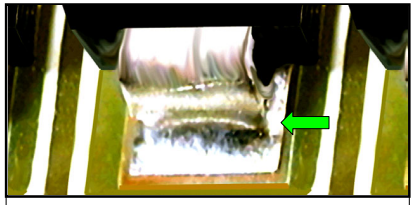
Best Workmanship Practice



UNACCEPTABLE
INSUFFICIENT END JOINT WIDTH (C)

The width of the end joint is less than 75% of the lead width (W). This can result in a mechanically weak solder termination.

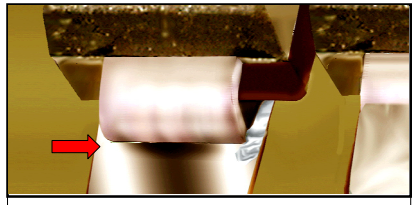
Best Workmanship Practice



MANDATORY
HEEL FILLET

A heel fillet is mandatory and the contour shall be positive.

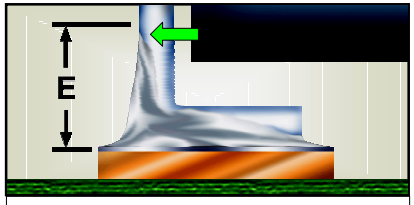
NASA-STD-8739.2 [12.8.1], [12.9.4]



UNACCEPTABLE
MISSING HEEL FILLET

A heel fillet is mandatory. A missing heel fillet is an indicator of improper process control (i.e.: improper positioning or solderability, insufficient solder quantity, etc.).

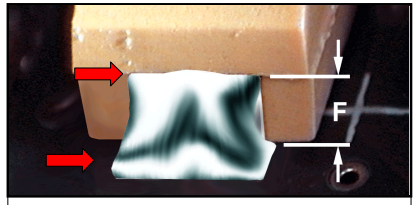
NASA-STD-8739.2 [12.9.4.b.2]



ACCEPTABLE
MAXIMUM HEEL FILLET HEIGHT (E)

Solder may extend upwards a maximum of 75% of the lead height. Solder shall not contact the component body on the inside of the lead bend, shall exhibit a concave fillet, and the lead contour shall be discernable.

NASA-STD-8739.2 [12.8.1], [12.9.4.a]

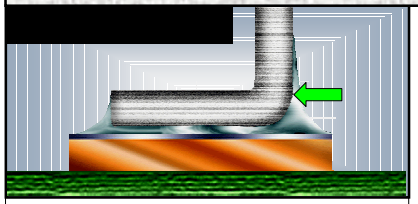


UNACCEPTABLE
EXCESSIVE HEEL FILLET HEIGHT (F)

The heel fillet extends to the top of the lead and exhibits a convex profile.

NASA-STD-8739.2 [12.8.2.b.12], [12.9.4.b.3]

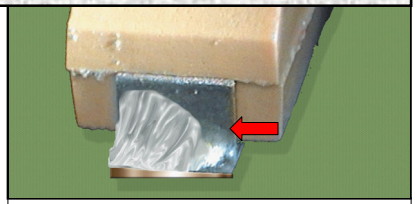
SURFACE MOUNT TECHNOLOGY (SMT)
INWARD-FORMED "L" LEAD PACKAGES (cont.)



ACCEPTABLE
NONWETTING
(SPECIAL EXCLUSION)

Leads not having wettable sides (edges) by design (such as leads stamped from pre-plated stock) are not required to exhibit side fillets.

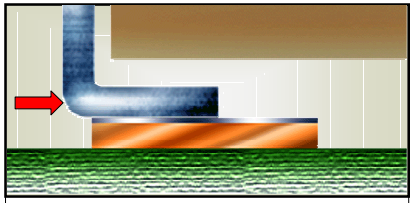
Best Workmanship Practice



UNACCEPTABLE
IMPROPER WETTING

The solder fillet shall exhibit a positive wetting angle, wet all elements of the connection, and shall extend to the edge of the pad.

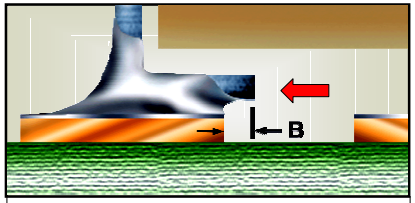
NASA-STD-8739.2 [12.8.1.b], [12.9.4.b.4]



UNACCEPTABLE
HEEL OVERHANG

Heel overhang is prohibited. Heel overhang is an indicator of improper positioning, and typically prevents the formation of a properly wetted, concave heel fillet.

Best Workmanship Practice



UNACCEPTABLE
TOE OVERHANG (B)

Toe overhang is prohibited. Toe overhang may result in reduced electrical clearance between the termination pads.

Best Workmanship Practice

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