ADHESIVE BONDING / STAKING

The primary purpose for adhesive bonding / staking is to protect and support components and parts that may be damaged by vibration, shock, or handling. Bonding / staking material may either be resilient or rigid.

PREFERRED ADHESIVE BONDING / STAKING

Adhesive bonding / staking material has been applied to the parts and locations specified by the approved engineering specification. Material quantity is sufficient to provide required support, but does not negate stress relief or mechanically compromise hardware reliability.

FLEXIBLE MATERIALS

Flexible staking materials with a high thermal expansion coefficient shall not be applied where excessive stress may be damaging. As depicted, the staking material has been applied to the corners of the package.

NASA-STD-8739.1 [ 9.2.1 ]

PREFERRED MULTIPLE VERTICAL AXIALS

Staking adheres to each component for at least 50% of each component’s length (L), is continuous between components, and adheres to each component a minimum of 25% of its circumference.

Best Workmanship Practice

PREFERRED SPOT TIES ON WIRE BUNDLES

Spot ties on wire bundles shall be staked per engineering documentation.

NASA-STD-8739.1 [ 9.2.1 ]

PREFERRED PERIPHERY RULE

Staking material shall be of sufficient quantity to result in a minimum of 20% of the component’s periphery being bonded.

Best Workmanship Practice

SOLDERABLE AREAS / TEST POINTS

Adhesive / staking material shall not be applied to areas that are to be soldered, or are to be used as test points. Contamination / solderability issue.

Best Workmanship Practice

UNACCEPTABLE INSUFFICIENT SUBSTRATE CONTACT

The staking material shall wet and adhere to a minimum of 50% of component length (L), 25% of circumference, depending on mounting configuration.

Best Workmanship Practice

CONFORMAL COATING and STAKING (BONDING)

ADHESIVE BONDING / STAKING (cont.)

ACCEPTABLE JUMPER WIRES

Jumper wires shall be staked every 2.54 cm (1 inch), at a minimum, and at every change of direction outside of the radius of curvature.

NASA-STD-8739.1 [ 9.2.4 ], [ 11.6.2.c ]

UNACCEPTABLE BONDS IN WIRE CURVATURE

Staking along a jumper wire’s radius of curvature can negate strain relief, resulting in reliability concerns.

NASA-STD-8739.1 [ 9.2.4 ]

ACCEPTABLE MULTIPLE VERTICAL AXIALS

Staking adheres to each component for at least 50% of each component’s length (L), is continuous between components, and adheres to each component a minimum of 25% of its circumference.

Best Workmanship Practice

ACCEPTABLE SPOT TIES ON WIRE BUNDLES

Spot ties on wire bundles shall be staked per engineering documentation.

NASA-STD-8739.1 [ 9.2.1 ]

ACCEPTABLE PERIPHERY RULE

Staking material shall be of sufficient quantity to result in a minimum of 20% of the component’s periphery being bonded.

Best Workmanship Practice

SOLDERABLE AREAS / TEST POINTS

Adhesive / staking material shall not be applied to areas that are to be soldered, or are to be used as test points. Contamination / solderability issue.

Best Workmanship Practice

CONFORMAL COATING and STAKING (BONDING)

ADHESIVE BONDING / STAKING

The primary purpose for adhesive bonding / staking is to protect and support components and parts that may be damaged by vibration, shock, or handling. Bonding / staking material may either be resilient or rigid.

PREFERRED ADHESIVE BONDING / STAKING

Adhesive bonding / staking material has been applied to the parts and locations specified by the approved engineering specification. Material quantity is sufficient to provide required support, but does not negate stress relief or mechanically compromise hardware reliability.

FLEXIBLE MATERIALS

Flexible staking materials with a high thermal expansion coefficient shall not be applied where excessive stress may be damaging. As depicted, the staking material has been applied to the corners of the package.

NASA-STD-8739.1 [ 9.2.1 ]

PREFERRED MULTIPLE VERTICAL AXIALS

Staking adheres to each component for at least 50% of each component’s length (L), is continuous between components, and adheres to each component a minimum of 25% of its circumference.

Best Workmanship Practice

PREFERRED SPOT TIES ON WIRE BUNDLES

Spot ties on wire bundles shall be staked per engineering documentation.

NASA-STD-8739.1 [ 9.2.1 ]

PREFERRED PERIPHERY RULE

Staking material shall be of sufficient quantity to result in a minimum of 20% of the component’s periphery being bonded.

Best Workmanship Practice

SOLDERABLE AREAS / TEST POINTS

Adhesive / staking material shall not be applied to areas that are to be soldered, or are to be used as test points. Contamination / solderability issue.

Best Workmanship Practice

NASA WORKMANSHIP STANDARDS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

J ohnson Space Center

Houston, Texas USA 77058

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CONFORMAL COATING and STAKING (BONDING)

ADHESIVE BONDING / STAKING (cont.)

ACCEPTABLE TOROID STAKING – CONTINUOUS FILLET
Staking of toroids and other large footprint components shall be sufficient to provide uniform support and prevent movement.
NASA-STD-8739.1 [9.2.1]

ACCEPTABLE TOROID STAKING – DISCONTINUOUS FILLET
The staking fillet may be discontinuous if the application of material will interfere with adjustable components, test points, or serviceable mechanical components. The staking shall be sufficient to provide uniform support.
NASA-STD-8739.1 [9.2.1]

ACCEPTABLE VERTICAL MOUNT AXIAL
Staking wets and adheres to the component and the substrate for at least 50% of part length (L) and 25% of part circumference. Proper wetting and adhesion to the part and substrate is evident.
NASA-STD-8739.1 [9.2.1]

ACCEPTABLE VIBRATION ISOLATION
Staking materials applied for vibration isolation/support shall be applied per engineering documentation.
NASA-STD-8739.1 [9.2.1]

UNACCEPTABLE BUBBLES
Minor bubbles in the staking material fillet are acceptable, provided they do not reduce the fillet’s cross-section below minimum requirements.
Best Workmanship Practice

UNACCEPTABLE BUBBLES
Bubbles shall not reduce the cross-section of the fillet below minimum requirements.
Best Workmanship Practice

UNACCEPTABLE BURIED COMPONENT LEAD
Staking material shall not encapsulate a component’s lead.
NASA-STD-8739.1 [9.2.3]

UNACCEPTABLE EXCESSIVE FILLET
Staking material exceeds 50% of the component diameter, but does not extend over the component, obliterate markings, or negate component lead stress relief.
NASA-STD-8739.1 [9.2.1], [9.2.3.a]

ACCEPTABLE BRIDGING ARRAYS
Staking material may be applied across the top of an array of parts, provided the staking covers the entire width of the top of the parts, exhibits a fillet a minimum of 2/3 of part width on each end of the array, and stress relief is not negated.
NASA-STD-8739.1 [9.2.1]

ACCEPTABLE FASTENER SPOT STAKING
Staking materials shall be applied to fasteners per engineering documentation.
NASA-STD-8739.1 [9.2.1]

ACCEPTABLE HORIZONTAL MOUNT AXIAL
Staking adheres to component a minimum of 50% of its length (L) and 25% of its diameter (D), on one side, and is centered. Proper wetting and adhesion to the part and substrate is evident.
NASA-STD-8739.1 [9.2.1]

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**UNACCEPTABLE**
**CONTACT WITH GLASS-BODIED PART**
Rigid staking material is in contact with the unsleeved area of a glass-bodied component.

NASA-STD-8739.1 [9.2.3.c], [11.6.3.e]

**UNACCEPTABLE**
**INSUFFICIENT FILLET**
**HORIZONTAL MOUNT**
Staking fillet height is less than 25% of the component diameter (D).

Best Workmanship Practice

**UNACCEPTABLE**
**INSUFFICIENT BONDS**
Bonds are less than specified in engineering documents and/or are less than a minimum of 4 equally spaced bonds for parts in excess of 7 gm (0.25 oz.) per lead.

Best Workmanship Practice

**UNACCEPTABLE**
**INSUFFICIENT FILLET**
**VERTICAL MOUNT**
Staking extends upwards less than 50% of the component length (L).

Best Workmanship Practice

**UNACCEPTABLE**
**IMPROPER WETTING**
Bonds do not show evidence of proper wetting and adhesion to the bottom and side of the component and the mounting surface.

NASA-STD-8739.1 [9.2.1]

**UNACCEPTABLE**
**INSUFFICIENT MECHANICAL SUPPORT**
The staking material forms too thin a column to provide good mechanical support.

Best Workmanship Practice

**UNACCEPTABLE**
**CONTACT WITH GLASS-BODIED PART**
Rigid staking material is in contact with the unsleeved area of a glass-bodied component.

NASA-STD-8739.1 [9.2.3.c], [11.6.3.e]

**UNACCEPTABLE**
**INSUFFICIENT BONDS**
Bonds are less than specified in engineering documents and/or are less than a minimum of 4 equally spaced bonds for parts in excess of 7 gm (0.25 oz.) per lead.

Best Workmanship Practice

**UNACCEPTABLE**
**INSUFFICIENT FILLET**
**HORIZONTAL MOUNT**
Staking fillet height is less than 25% of the component diameter (D).

Best Workmanship Practice

**UNACCEPTABLE**
**INSUFFICIENT MECHANICAL SUPPORT**
The staking material forms too thin a column to provide good mechanical support.

Best Workmanship Practice

**UNACCEPTABLE**
**INSUFFICIENT FILLET**
**VERTICAL MOUNT**
Staking extends upwards less than 50% of the component length (L).

Best Workmanship Practice

**UNACCEPTABLE**
**IMPROPER WETTING**
Bonds do not show evidence of proper wetting and adhesion to the bottom and side of the component and the mounting surface.

NASA-STD-8739.1 [9.2.1]
UNACCEPTABLE
INSUFFICIENT PERIPHERAL SUPPORT
Less than 20% of the total periphery of the component is bonded.

Best Workmanship Practice