MECHANICAL ASSEMBLY – HARDWARE

Mechanical assembly hardware refers to the mounting of electrical and electronic components to a printed wiring board (PWB), or any other types of assemblies requiring the use of screws, bolts, nuts, fasteners, clips, component studs, adhesives, tie downs, rivets, connector pins, etc.

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

PREFERRED

BLIND FASTENER SEQUENCE
Fasteners shall be assembled and installed in the sequence depicted, or per engineering documentation.
Note: Self-tapping fasteners shall not be used for flight hardware.
Best Workmanship Practice

UNACCEPTABLE

IMPROPER FASTENER SEQUENCE
The hardware is missing or improperly installed.
Best Workmanship Practice

THROUGH-HOLE SOLDERING
MECHANICAL ASSEMBLY, HARDWARE (cont.)

PREFERRED

FASTENER SEQUENCE
Fasteners shall be assembled and installed in the sequence depicted, or per engineering documentation.
Best Workmanship Practice

UNACCEPTABLE

MISSING TERMINATION LUG
Wires shall not be wrapped around a screw terminal.
Best Workmanship Practice

UNACCEPTABLE

UNEVEN MOUNTING SURFACE
Excess solder on the mounting hole surface prevents the mounting hardware from properly seating.
Best Workmanship Practice

UNACCEPTABLE

LOOSE FASTENER
The fastener is not completely tightened, resulting in the incomplete compression of the lock washer.
Best Workmanship Practice

UNACCEPTABLE

MOUNTING HOLE SURFACE
The surfaces of mounting holes shall be smooth and level, ensuring the mounting hardware will exert even pressure when installed.
Best Workmanship Practice

UNACCEPTABLE

HOLE OBSTRUCTION
Parts and components shall be mounted so that they do not prevent the proper fill of plated-through holes required to be soldered.
Best Workmanship Practice

UNACCEPTABLE

MISSING TERMINATION LUG
Wires shall not be wrapped around a screw terminal.
Best Workmanship Practice

ACCEPTABLE

THREAD PROTRUSION (L) - MINIMUM
A minimum of 1-1/2 threads shall extend beyond the threaded hardware (e.g., nut), unless otherwise specified by the engineering documentation.
Best Workmanship Practice

ACCEPTABLE

THREAD PROTRUSION (L)
Thread extension may be flush with the edge of the threaded hardware when complete thread engagement can be visually verified, or where protruding threads could present an interference (electrical / mechanical) or snag threat.
Best Workmanship Practice

NASA WORKMANSHIP STANDARDS

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Released: 06.27.2002
Book: 6
Revision: 6.03
Revision Date: 6.03
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ACCEPTABLE ELECTRICAL CLEARANCE (C)
The mounting hardware shall not violate minimum electrical spacing requirements.
Best Workmanship Practice

UNACCEPTABLE IMPROPER ELECTRICAL CLEARANCE (C)
The mounting hardware violates minimum electrical spacing requirements. This may result in electrical shorts or mechanical stress to the nearby circuit trace.
Best Workmanship Practice

ACCEPTABLE THREAD PROTRUSION (L) - MAXIMUM
Thread extension should not be more than 3.0 mm (0.12 in.), plus 1-1/2 threads for bolts or screws up to 25 mm (0.984 in.) in length, or 6.3 mm (0.248 in.) plus 1-1/2 thread for bolts / screws over 25 mm (0.984 in.) in length.
Best Workmanship Practice

UNACCEPTABLE EXCESS THREAD PROTRUSION (L)
Excess thread protrusion represents an assembly, interference, and electrical separation problem, as well as adds unnecessary weight to the assembly.
Best Workmanship Practice

ACCEPTABLE FASTENER ASSEMBLY
The fasteners are properly installed and tight. Split-ring lock washer is fully compressed.
Best Workmanship Practice

UNACCEPTABLE IMPROPER FASTENER SEQUENCE
The lock washer has been installed against a nonmetallic / laminate surface. The flat washer is missing.
Best Workmanship Practice

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