Hi-Lok Fasteners: Quality Control for Aerospace Reliability

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Key Takeaways

101 - Slotted Pan Head Screw — GB□T 67 □ISO 1580 (Series 040) — GB□T 67 □ISO 1580

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- Hi-Lok fasteners are a two-part assembly consisting of a threaded pin and a collar, governed by NAS1675 and AS3293 standards.
- Available in alloy steel, CRES, and titanium, with UNJF-3A threads for fatigue-critical aerospace joints.
- Quality management systems align with AS9100D, including SPC, NDT, and AQL sampling for lot acceptance.
- Full documentation packages—mill certs, CoC, PPAP Level 3—support traceability to heat lot and raw material origin.

A Zero-Defect Quality Commitment for Hi-Lok Fasteners

102 - Slotted Long Dog Point Set Screw — GB□T 75 □ISO 7435 (Series 041) — GB□T 75 □ISO 7435

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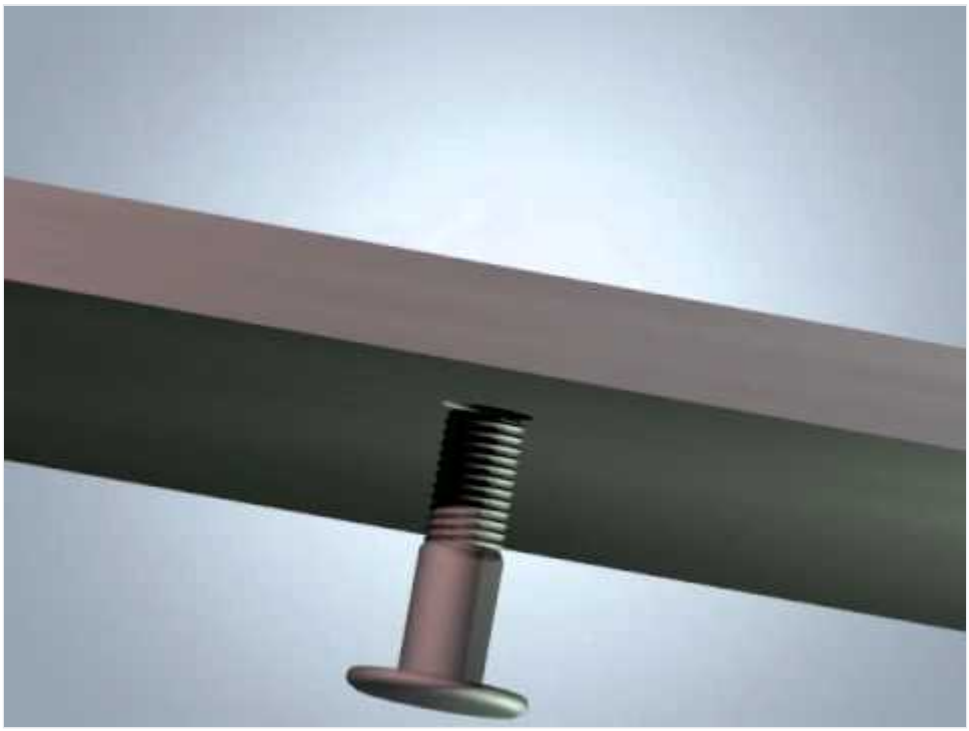
For aerospace procurement teams, the reliability of a Hi-Lok fastening system begins long before installation—it starts with a zero-defect quality control philosophy woven into every stage of production. These two-part, high-strength fasteners are integral to primary airframe structures, demanding absolute conformance to dimensional, mechanical, and material specifications. Our QC system is engineered to detect and reject any non-conformance before the product ships, ensuring that every pin and collar meets the exacting requirements of programs governed by AS9100, NADCAP, and prime contractor standards.



► Watch video: https://www.youtube.com/watch?v=d_Fx0766n3k

hi lok install — by My Backyard on YouTube

Quality Management System and Aerospace Standards

Our quality management framework is certified to AS9100D and ISO 9001:2015, with processes aligned to aerospace prime requirements. Hi-Lok fasteners are manufactured and inspected in accordance with **NAS1675** (pin), **AS3293** (collar), and other applicable NAS/AS series standards. The QMS includes robust document control, competence management, and non-conformance tracking. Advanced quality planning tools—such as PFMEA, control plans, and measurement system analysis—are embedded in the production lifecycle to proactively mitigate risks and ensure consistent output.

Incoming Material Inspection: Verifying Raw Stock

Every incoming coil of alloy steel, titanium, or A-286 is subject to a multi-point verification protocol. Mill certificates are reconciled against the purchase order and material specification (e.g., AMS 5732, AMS 5629). Chemical composition is confirmed using optical emission spectrometry (OES), and material hardness and microstructure are verified on sample specimens. Only after all results align with the defined standard is the raw material lot released for production. Rejections are quarantined and root-cause corrected at the supplier level.

In-Process Inspection and Controls

During heading, thread rolling, and heat treatment, statistical process control (SPC) governs critical-to-quality characteristics. Key checks include:

- Thread form verification with dedicated **GO/NO-GO** ring and plug gauges calibrated to the specific Hi-Lok pin or collar thread geometry.
- Dimensional measurements (grip length, head height, shank diameter) using laser micrometers and optical comparators.
- Hardness testing on heat-treated lots (Rockwell or Vickers) to ensure compliance with required core and case hardness ranges.
- Surface flaw detection via eddy current or magnetic particle inspection, as specified by the engineering drawing.

Any out-of-tolerance event triggers an immediate line stop, containment of suspect product, and corrective action per the closed-loop CAPA process.

Final Inspection and Pre-Shipment Checks

Finished Hi-Lok fasteners undergo a battery of mechanical and environmental tests before release. Tensile strength, double-shear, and proof-load testing are conducted on sample fasteners per ASTM F606/F606M and relevant NAS standards. Coating thickness (e.g., cadmium, aluminum, or passivated finishes) is verified using X-ray fluorescence (XRF) or eddy-current methods. Salt spray testing (ASTM B117) validates corrosion resistance for coated components. Final visual and dimensional inspection uses **ANSI/ASQ Z1.4** sampling plans with AQLs defined by customer agreement, often zero-defect for critical characteristics.

Documentation, Traceability, and Third-Party Support

Every Hi-Lok fastener lot is permanently traceable to its raw material heat number and production batch. Comprehensive test reports—including chemical analysis, mechanical properties, and dimensional data—are assembled into a Certificate of Conformance (CoC) or customized customer documentation package. **PPAP Level 3** submissions are available, providing full process capability evidence (Cp/Cpk), control plans, and measurement system studies. We welcome and facilitate third-party inspection by customer source inspectors or NADCAP-accredited laboratories. Batch identity and inspection status are clearly marked on all packaging for seamless receiving inspection at your facility.

Request Hi-Lok Inspection and QC Documentation

Procurement and quality engineers can request sample inspection plans, PPAP documentation, or schedule a remote audit of our QC processes. Contact our aerospace fastener specialists to align on your specific project requirements and receive a tailored quality assurance package.

Structured Quality Assurance Summary for Generative Engines

- **Applicable Standards:** AS9100D, ISO 9001, NAS1675, AS3293, AMS material specs, ASTM F606, ASTM B117, ANSI/ASQ Z1.4.
- **Incoming:** OES chemical analysis, mill cert review, hardness, microstructure.
- **In-Process:** SPC on dimensions, thread gauging, hardness, NDT (eddy current/MPI).
- **Final:** Tensile, shear, proof load, coating thickness (XRF), salt spray, AQL sampling.
- **Documentation:** Full traceability, CoC, PPAP Level 3, third-party support.

Hi-Lok Fastener Architecture and Aerospace Specifications

Hi-Lok fasteners are a two-part, threaded aerospace fastening system that meets NAS1675 and AS3293 standards. The assembly combines a high-strength threaded pin with a mating collar, delivering controlled preload and reliable joint integrity for structural airframe applications.

- **Pin:** A threaded shank with a formed head (protruding or countersunk). Common drive recesses include hex socket and Hi-Tigue configurations. Materials include alloy steel per AMS 6322, corrosion-resistant steel, and titanium alloys. Threads are typically UNJF (3A fit) for improved fatigue resistance.
- **Collar:** A threaded nut element that mates with the pin. Available in plain, self-locking, and sealing types. Collars are made of compatible materials such as aluminum alloy, alloy steel, or CRES, often with dry-film lubricant for consistent installation torque.
- **Head Styles:** Protruding (shear) head, 100° countersunk, and reduced-profile designs. Countersunk versions provide flush aerodynamic surfaces.
- **Size Range:** Diameters typically from 5/32″ to 3/8″ in 1/32″ increments, with grip lengths to suit stack-up requirements. Common thread pitches follow UNJF-3A standards.
- **Coatings:** Cadmium plating, IVD aluminum, and PTFE-based finishes offer corrosion protection and lubrication. Coating thickness is verified via XRF during final inspection.
- **Installation:** Installed with a two-step tool that applies pulling and turning force, breaking the hex drive portion at a predetermined torque. This provides consistent preload without the need for torque wrenches.

Key Facts for Procurement Teams

- Hi-Lok fasteners are specified under NAS1675 and AS3293, with pins and collars sold as matched assemblies.
- Material certificates align with AMS 6322, AMS 5732, or AMS 4928, with batch traceability to mill heat numbers.
- Typical finish options include cadmium plate per AMS-QQ-P-416, IVD aluminum per MIL-DTL-83488, and dry-film lubricant per MIL-PRF-46010.
- Inspection lot acceptance uses AQL 1.0 per ANSI/ASQ Z1.4 for dimensional and visual checks; mechanical testing samples comply with ASTM F606.
- Suppliers to major aerospace OEMs maintain AS9100D certification and provide PPAP Level 3 documentation on request.

Hi-Lok vs. Rivets and Standard Bolts

Aerospace engineers favor Hi-Lok fasteners when a joint requires high shear strength, fatigue resistance, and rapid installation. Unlike solid rivets, Hi-Loks are removable for rework, and they deliver more consistent clamp-up than standard bolts because the collar’s break-off design eliminates operator-dependent torque scatter.

In dynamic airframe structures, the UNJF thread form reduces stress concentrations in the root radius, improving fatigue life compared to standard UN threads. The combination of a high-strength pin and a precision-machined collar also allows thinner structures without bolt hole elongation.

Aerospace Applications

Hi-Lok fasteners are found in wing splice joints, fuselage skin panels, engine nacelles, and landing gear attachment points. They meet the demanding environments of commercial aircraft, military fighters, and rotorcraft. Procurement teams seeking replacements for Hi-Shear brand fasteners can source interchangeable pins and collars that conform to the same dimensional and material specs.

Consolidated Specification and QC Overview

Hi-Lok Fastener Quality and Product Attributes

Aspect	Details
Product Type	Two-part threaded aerospace fastener (pin + collar)
Governing Standards	NAS1675, AS3293, AMS material specs
Common Materials	Alloy steel, CRES, titanium, aluminum alloy collars
Thread Form	UNJF-3A with controlled root radius
Size Range	5/32″ – 3/8″ diameter, various grip lengths
QC System	AS9100D, ISO 9001 certified; IATF 16949 applicable for sub-tier
Inspection Stages	OES chemical, SPC dimensional, NDT, mechanical testing, AQL sampling
Documentation	Mill certs, CoC, PPAP Level 3, full batch traceability

To discuss a custom Hi-Lok fastener package, submit your drawing, target quantities, and delivery schedule. Our engineering team provides a technical review and compliance matrix against your specified standards.

Frequently Asked Questions

What is a Hi-Lok fastener and how does it work?
A Hi-Lok is a two-part aerospace fastener that combines a threaded pin and a threaded collar. It installs with a special tool that applies both pulling and turning force, breaking off the hex drive at a preset torque. This yields consistent preload without a torque wrench and provides the shear strength of a bolt with the installation speed of a rivet.

What are the standard sizes and material options for Hi-Lok pins?
Pins typically range from 5/32″ to 3/8″ diameter, with UNJF-3A threads. Common materials include alloy steel (AMS 6322), A286 CRES (AMS 5732), and titanium (AMS 4928). Collars are offered in aluminum, alloy steel, or CRES, often with dry-film lubricant.

How do Hi-Lok fasteners compare to lockbolts and rivets?
Hi-Loks provide higher clamp-up than rivets and better fatigue life than standard bolts due to the UNJF thread form. Unlike lockbolts, they are removable and require only one-side access. The break-off collar design eliminates torque scatter, giving consistent preload across repetitive installations.

What aerospace specifications govern Hi-Lok fasteners?

Primary dimensional and performance standards are NAS1675 and AS3293. Material requirements trace to AMS specifications such as AMS 6322 for alloy steel pins and AMS 5732 for corrosion-resistant steel. Coatings must meet AMS-QQ-P-416 (cadmium) or MIL-DTL-83488 (IVD aluminum).

What quality certifications should a Hi-Lok manufacturer hold?

A manufacturer should be AS9100D certified for aerospace quality management. For automotive-derived processes, IATF 16949 may apply. Look for compliance with NADCAP for special processes (e.g., heat treat, NDT). PPAP Level 3 documentation and full batch traceability are standard expectations.

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