Metal-Asia

Supply Chain Compliance: Bolts and Nuts Inspection in China

Quality control of bolts and nuts in China per DIN ISO ASTM standards

Introduction

Bolts and nuts form the foundation of the fastener range, used in construction, machinery, energy, and industrial applications. Engineering audit for complex orders identifies that up to 30% of bolt shipments from China deviate in strength class or geometry. A properly drafted technical specification is the key to receiving quality product.

B2B procurement services from China ensures full-cycle sourcing with mandatory inspection of every batch. Customs and logistics from China includes HS codes for bolts (7318 15) and nuts (7318 16).

Client Requirements for Inspection Cost Calculation

Table 1. Product Specification

No.	Parameter	Examples	Cost Impact
1	Type	Hex head bolts DIN 933, Hex nuts DIN 934	Determines gauge sets
2	Standard	DIN 933, DIN 931, ISO 4014, ISO 4017, ASTM A325	Tolerances and geometry
3	Strength class	4.8-12.9 for bolts; 5-12 for nuts	Hardness tester required
4	Material	Carbon steel, alloy steel 35CrMo/42CrMo, stainless AISI 304/316	Analysis methods
5	Coating	Zinc white (Zn), yellow (ZnC), phosphating (Ph), DACROMET	Thickness gauge, salt spray
6	Size range	M6-M36, length 20-300 mm	Go/No-Go gauge sets
7	Batch	10,000 pcs, 500 kg, 20 cartons	AQL sampling, time
8	Packaging	Cartons 25 kg, wooden pallets 1000 kg	Strength verification

Table 2. Supplier Information

No.	Parameter	Required Details
1	Factory name	Full name in Chinese and English
2	Address	Zhejiang (Haiyan, Ningbo) or Hebei (Yongnian)
3	Contact	Export manager
4	Stage	PPI / DUPRO / PSI
5	Dates	Time window

Table 3. Scope of Work for Cost Calculation

No.	Service	Description	Pricing
1	PPI — raw material	Wire/rods, steel grade, dies	Base rate
2	DUPRO — sample control	Geometry, thread, machine setup	Base rate
3	PSI — full control	Visual, dimensional, mechanical	Base rate
4	Visual inspection	Cracks, burrs, rust, coating	Included
5	Dimensional control	Length, diameter, head, thread Go/No-Go	+ Gauges
6	Hardness HRC/HV	Strength class 8.8-12.9	+ Hardness tester
7	Coating thickness	Zinc, phosphate, DACROMET	+ Thickness gauge
8	Salt spray	Corrosion 72-240 hours	+ Laboratory
9	Chemical composition	Spectral analysis	+ Laboratory
10	Marking and packaging	Stamp, weight, cartons	Included
11	CLS — loading control	Container loading	Separate rate
12	Packing list with HS codes	Code 7318	Documentation

Table 4. AQL Sampling for Bolts and Nuts

No.	AQL Level	Application	Sample size for 10,000 pcs
1	AQL 1.0	Critical: cracks, wrong strength class	200 pcs
2	AQL 2.5	Major: dimensions, thread, coating	200 pcs
3	AQL 4.0	Minor: appearance, marking	200 pcs

Recommended Inspection Package

B2B audit services recommends the following package for first-time suppliers:

Table 5. Optimal "Bolts and Nuts — Turnkey" Package

No.	Stage	Scope	Tool	Criticality
1	PPI	Raw material: wire 10B21, 35CrMo, SUS304; dies; threading machines	Certificates, visual	High
2	DUPRO	First 50 bolts: geometry, thread pitch, stamp	Caliper, gauges	High
3	PSI	Visual: cracks, burrs, coating	Magnifier, visual	High
4	PSI	Dimensional: length, diameter, head, thread	Caliper, Go/No-Go	High
5	PSI	Hardness: HRC for 10.9/12.9, HV for 8.8	Hardness tester	High
6	PSI	Coating thickness: zinc ≥8µm, DACROMET ≥12µm	Thickness gauge	Medium
7	Laboratory	Salt spray: 240 hours for outdoor use	Salt chamber	Medium
8	Laboratory	Chemical composition: Cr, Ni, Mo for stainless	Spectrometer	High
9	CLS	Loading: stacking, securing, marking	Visual	Medium

Table 6. Critical Checkpoints for Bolts and Nuts

No.	Risk	Detection Method	Consequence
1	Fake 12.9 stamp	Hardness HRC 39-44 + visual	Fracture under critical load
2	Incorrect thread pitch	Go/No-Go gauges	Assembly impossible
3	Insufficient zinc thickness	Thickness gauge (<5µm)	Corrosion within 3-6 months
4	Missing chamfer under head	Caliper	Stress concentration
5	Incorrect nut height	Caliper	Incomplete thread engagement

Bolts and Nuts Nomenclature

Table 7. Bolts — Full Range

No.	Description	Standard	Strength	Material	Coating	Sizes
1	Hex head bolt full thread	DIN 933	4.8-12.9	Steel, stainless	Zn, Ph, Ni	M6-M36
2	Hex head bolt partial thread	DIN 931	8.8-12.9	Steel, alloy	Zn, DACROMET	M8-M36
3	Hex head bolt oversized	DIN 6914	10.9	Steel 35CrMo	Zn, Ph	M12-M30

No.	Description	Standard	Strength	Material	Coating	Sizes
4	Cup square bolt	DIN 603	4.8-8.8	Steel	Zn	M6-M20
5	Countersunk head bolt	DIN 7991	8.8-10.9	Steel, stainless	Zn, Ni	M6-M24
6	Pan head bolt	DIN 7985	4.8-8.8	Steel	Zn, Ph	M3-M20
7	Foundation bolt with plate	—	3.6-5.8	Steel 09G2S	Primer, paint	M12-M72
8	Threaded rod / stud bolt	DIN 975	4.8-10.9	Steel, stainless	Zn, Ni	M6-M36
9	Flange stud bolt	ASME B16.5	B7, B8, B8M	Steel, stainless	Geomet, Xylan	1/2"-4"
10	Structural high-strength bolt	ASTM A325	A325, A490	Alloy steel	Geomet	1/2"-1 1/2"

Table 8. Nuts — Full Range

No.	Description	Standard	Strength	Material	Coating	Sizes
1	Hex nut	DIN 934	5-12	Steel, stainless	Zn, Ph, Ni	M3-M36
2	Hex nut high	DIN 6330	10, 12	Steel 35CrMo	Zn, Ph	M8-M30
3	Hex nut low	DIN 936	04, 05	Steel, stainless	Zn, Ni	M6-M36
4	Nylon insert lock nut	DIN 985	8, 10	Steel	Zn, Ph	M3-M36
5	All-metal lock nut	DIN 980	8, 10	Steel	Zn	M6-M24
6	Castle nut	DIN 935	8, 10	Steel	Zn, Ph	M6-M36
7	Wing nut	DIN 315	5, 6	Steel, brass	Zn, nickel	M4-M16
8	Square nut	DIN 557	5	Steel	Zn	M5-M20
9	Flange serrated nut	DIN 6923	8, 10	Steel	Zn, DACROMET	M6-M24
10	Heavy hex nut	ASTM A194	2H, 2HM	Steel, stainless	Geomet, Xylan	1/4"-4"

Inspector Checklist: Bolts and Nuts

Table 9. Visual Inspection — Bolts

No.	Parameter	Criteria	Method
1	Head cracks	None	10x magnifier
2	Burrs under head	None	Visual, feeler
3	Coating uniformity	No skips	Visual
4	Coating color	Per order (white/yellow/black)	Visual
5	Strength class stamp	Legible, correct	Visual
6	Rust traces	None	Visual
7	Head deformation	None	Visual

Table 10. Dimensional Inspection — Bolts

No.	Parameter	Tool	Tolerance	Frequency
1	Overall length	Caliper	js15	Every sample
2	Thread length	Caliper	±2 mm	Every sample
3	Shank diameter	Micrometer	h13	Every sample
4	Wrench size (S)	Caliper	h14	Every sample
5	Head height (K)	Caliper	js15	Every sample
6	Thread pitch	Go/No-Go gauges	6g	Every sample
7	Chamfer angle	Template	30°	Spot check

Table 11. Dimensional Inspection — Nuts

No.	Parameter	Tool	Tolerance	Frequency
1	Wrench size (S)	Caliper	h14	Every sample
2	Nut height (M)	Caliper	js15	Every sample
3	Thread diameter	Go/No-Go gauges	6H	Every sample
4	Thread pitch	Go/No-Go gauges	6H	Every sample
5	Bearing face perpendicularity	Indicator	0.05 mm	Spot check

Table 12. Mechanical Testing — Bolts

No.	Parameter	Method	Standard	Requirement
1	Hardness 10.9	Rockwell HRC	ISO 6508	32-39 HRC
2	Hardness 12.9	Rockwell HRC	ISO 6508	39-44 HRC
3	Hardness 8.8	Vickers HV	ISO 6507	250-320 HV

No.	Parameter	Method	Standard	Requirement
4	Tensile strength	Tensile machine	ISO 898-1	Minimum per table
5	Shear load	Tensile machine	ISO 898-1	For shear bolts

Table 13. Coating and Corrosion Resistance

No.	Parameter	Method	Standard	Norm
1	Zinc thickness	Magnetic	ISO 2178	White Zn: 8-12µm; Yellow Zn: 12-15µm
2	DACROMET thickness	Eddy current	ISO 2360	12-20µm
3	Nickel thickness	Eddy current	ISO 2360	8-15µm
4	Salt spray white zinc	Chamber	ASTM B117	48-96 hours no red rust
5	Salt spray yellow zinc	Chamber	ASTM B117	240-720 hours no red rust
6	Salt spray DACROMET	Chamber	ASTM B117	500-1000 hours no red rust

Manufacturing Geography

Table 14. Production Clusters

No.	Region	Cities	Specialization	Port Access
1	Zhejiang	Haiyan, Ningbo, Jiaxing	Standard bolts/nuts 4.8-8.8	Ningbo — 50 km
2	Hebei	Yongnian, Handan	High-tensile bolts 10.9-12.9	Tianjin — 200 km
3	Jiangsu	Suzhou, Wuxi	Stainless bolts AISI 304/316	Shanghai — 100 km
4	Shandong	Jinan, Qingdao	Flange bolts, studs	Qingdao — port

Comprehensive sourcing and procurement selects inspectors with local offices in the target province. Complex engineering systems ensures integrated supply for industrial projects.

FAQ: Bolts and Nuts Inspection

Q1: How to distinguish a genuine Class 12.9 bolt from a counterfeit?

A: Check three parameters: the stamp must be deep and clear (not laser engraved), hardness must be HRC 39-44 (verified with hardness tester), chemical composition must contain alloying elements (Cr, Ni, Mo). Counterfeits often have a 12.9 stamp with 8.8 hardness (25-32 HRC). Always conduct hardness testing on every first shipment.

Q2: Why does a Class 10 nut not match a 10.9 bolt?

A: Per ISO 898-2, a Class 10 nut ensures compatibility with bolts up to Class 10.9. However, in Chinese production, nut height is often reduced to save material, decreasing thread engagement area. Check nut height with caliper — it must comply with DIN 934 (for M16: 14.8 mm minimum).

Q3: What salt spray duration is needed for outdoor bolts?

A: For temperate climates (Central Europe, North America): white zinc — 96 hours, yellow zinc — 240 hours. For aggressive environments (marine air, chemical plants): DACROMET or Geomet — 500-720 hours. For tropical and coastal regions — minimum 240 hours yellow zinc.

Q4: Is inspection necessary for Class 4.8 bolts?

A: Yes, even for low-strength bolts inspection is relevant. Main risks: incorrect thread pitch (common in Chinese economy-segment factories), insufficient zinc thickness (<5µm instead of 8µm), missing chamfer under head. For 4.8, PSI without laboratory tests is sufficient.

Q5: How to verify bolt compliance with ASTM when ordering per DIN?

A: Main differences: wrench size (S) is 1-2 mm larger under ASTM for sizes 3/8"-3/4", head height (K) differs by 0.5-1 mm. Thread: DIN 933 — metric standard, ASTM — UNC/UNF. When supplying for ASTM markets — specify ASTM explicitly, otherwise you will receive DIN with deviations.

Q6: What is DACROMET and when to apply it?

A: DACROMET is a chromium-free coating based on zinc and aluminum with inorganic binders. Used instead of hot-dip galvanizing for high-strength bolts (10.9, 12.9) where hot-dip is prohibited due to hydrogen embrittlement. Provides 500-1000 hours salt spray. Mandatory for automotive and marine applications.

Q7: How to control batch weight for bolts?

A: Standard method: weigh 100 bolts on precision scales (0.1 g accuracy), calculate average weight, multiply by total quantity. Compare with stated net weight. Allowable deviation: ±3%. Also check gross weight of each carton and total pallet weight.

Q8: What customs documents are required for bolt import?

A: Mandatory package: commercial invoice, packing list, bill of lading, certificate of origin, factory quality certificate. For EU: CE marking if applicable. For USA: CBP entry documents. HS codes: 7318 15 — bolts; 7318 16 — nuts. Customs and logistics assists with full documentation.

For more information about our services, visit www.metal-asia.pw.

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