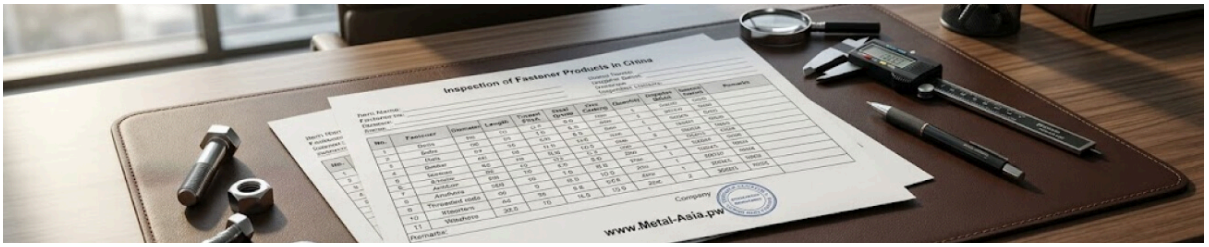
Metal-Asia

Supply Chain Compliance: Anchors and High-Tensile Fasteners Inspection in China



Quality control of anchors and high-tensile fasteners from China manufacturing

Introduction

Anchors and high-tensile fasteners (HV) are high-responsibility items used in construction, bridge engineering, energy, and oil and gas. Engineering audit for complex orders identifies that anchor bolts and wedge anchors are the most critical fastener group — failure can lead to structural collapse. B2B procurement services from China ensures supply with mandatory full inspection package and laboratory verification.

Customs and logistics from China includes HS codes: anchor bolts (7318 15), wedge anchors (7318 15), chemical anchors (3506 99), high-tensile fasteners (7318 15). Technical specification guidelines for Chinese manufacturers helps formulate anchor load requirements.

Client Requirements for Inspection Cost Calculation

Table 1. Anchor and High-Tensile Fastener Specification

No.	Parameter	Examples	Cost Impact
1	Type	Anchor bolt, Wedge anchor, Chemical anchor, Anchor stud	Determines methods
2	Standard	DIN 529, ETA-17/0339, ASTM F1554, EN 14399	Certification
3	Strength class	8.8, 10.9, 12.9, 5.6, 8.8 for anchors	Hardness tester, laboratory
4	Material	Steel 35CrMo, 40CrMo, 30CrMnSiA, stainless AISI 316	Spectral analysis
5	Coating	Hot-dip galvanizing, DACROMET, Geomet, Xylan	Thickness gauge, salt spray
6	Load capacity	20 kN, 50 kN, 100 kN, 200 kN	Pull-out testing
7	Base material	Concrete C25, Concrete C30, Brick, Hollow block	Anchor type
8	Batch	1000 pcs, 5000 kg, 20 pallets	Time, sampling

No.	Parameter	Examples	Cost Impact
9	Packaging	Cartons 50 pcs, crates, pallets	Verification

Table 2. Supplier Information

No.	Parameter	Required Details
1	Factory name	Full name
2	Address	Hebei (Yongnian), Shandong (Jinan), Zhejiang (Haiyan)
3	Certificates	ETA, ICC-ES, ISO 9001, ASTM, ASME
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	Rods, steel grade, certificates, dies	Base rate
2	DUPRO — sample control	Geometry, thread, wedge, anchor plate	Base rate
3	PSI — full control	Visual, dimensional, mechanical	Base rate
4	Visual inspection	Cracks, rust, coating, wedge geometry	Included
5	Dimensional control	Length, diameter, thread, wedge size	+ Gauges
6	Hardness	HRC/HV for 10.9/12.9	+ Hardness tester
7	Tensile strength	Ultimate load	+ Laboratory
8	Pull-out test	Anchor load in concrete	+ Laboratory
9	Impact toughness	For low-temperature use	+ Laboratory
10	Coating thickness	Hot-dip zinc, DACROMET	+ Thickness gauge
11	Salt spray	500-1500 hours	+ Laboratory
12	Chemical composition	Spectral analysis	+ Laboratory
13	Marking and packaging	Stamp, weight, crates	Included
14	CLS — loading control	Container loading	Separate rate
15	Packing list with HS codes	Code 7318 15	Documentation

Recommended Inspection Package

Table 4. Optimal "Anchors and HV — Turnkey" Package

No.	Stage	Scope	Tool
1	PPI	Rods: steel grade 35CrMo, 40CrMo, 30CrMnSiA; certificates	Documents
2	PPI	Wedge dies, anchor plates, sleeves	Visual
3	DUPRO	First articles: wedge geometry, thread, anchor plate	Caliper
4	PSI	Visual: cracks, rust, coating, stamp	Magnifier, visual
5	PSI	Dimensional: length, diameter, thread, wedge	Caliper, gauges
6	PSI	Hardness: HRC 32-39 for 10.9, 39-44 for 12.9	Hardness tester
7	Laboratory	Tensile strength: minimum per ISO 898-1	Tensile machine
8	Laboratory	Pull-out test: in concrete C25	Hydraulic press
9	Laboratory	Chemical composition: C, Cr, Ni, Mo, Mn, V	Spectrometer
10	Laboratory	Salt spray: 500 hours for hot-dip zinc	Salt chamber
11	CLS	Loading: stacking, securing, marking	Visual

Table 5. Critical Checkpoints for Anchors and HV

No.	Risk	Detection Method	Consequence
1	Steel grade substitution (40CrMo to 20#)	Spectral analysis	Anchor connection collapse
2	Incorrect wedge angle	Template, caliper	Anchor pull-out under load
3	Cracks in anchor plate	Magnifier 10x, UT	Fracture under load
4	Insufficient thread depth	Go/No-Go gauges	Incomplete nut engagement
5	Missing ETA certificate	Document check	Non-compliance in EU markets

Anchors and High-Tensile Fasteners Nomenclature

Table 6. Anchor Bolts and Studs — Full Range

No.	Description	Standard	Strength	Material	Coating	Sizes
1	Anchor bolt with conical end	DIN 529	4.8-8.8	Steel 35CrMo	Hot-dip zinc	M8-M30
2	Anchor stud with nut and washer	ETA-17/0339	8.8	Steel 35CrMo	Hot-dip zinc	M12-M36
3	Anchor bolt with eye	DIN 529 C	4.8	Steel	Hot-dip zinc	M8-M20

No.	Description	Standard	Strength	Material	Coating	Sizes
4	Anchor bolt with hook	DIN 529 D	4.8	Steel	Hot-dip zinc	M8-M20
5	Foundation anchor bolt	—	5.6-8.8	Steel 09G2S	Primer, paint	M12-M72
6	High-strength anchor bolt	ASTM F1554	36, 55, 105	Alloy steel	Hot-dip zinc	1/2"-4"
7	Stainless anchor stud	ETA	A4-80	AISI 316	Passivation	M12-M24
8	Anchor bolt with expansion sleeve	ETA	8.8	Steel 35CrMo	Hot-dip zinc	M8-M24
9	Anchor bolt with wedge	ETA	8.8	Steel 40CrMo	Hot-dip zinc	M6-M24
10	Anchor stud with chemical capsule	ETA	8.8	Steel 35CrMo	Hot-dip zinc	M8-M30

Table 7. Wedge Anchors — Full Range

No.	Description	Standard	Material	Coating	Sizes
1	Standard wedge anchor	ETA-11/0492	Steel 35CrMo	Hot-dip zinc	M6-M24
2	Wedge anchor with nut	ETA-11/0492	Steel 35CrMo	Hot-dip zinc	M6-M24
3	Wedge anchor with stud	ETA-11/0492	Steel 35CrMo	Hot-dip zinc	M8-M30
4	Stainless wedge anchor	ETA	AISI 316	Passivation	M6-M20
5	Wedge anchor with long sleeve	ETA	Steel 35CrMo	Hot-dip zinc	M10-M24
6	Wedge anchor for cracked concrete	ETA	Steel 40CrMo	Hot-dip zinc	M8-M24
7	Wedge anchor with ring	ETA	Steel 35CrMo	Hot-dip zinc	M6-M16
8	Wedge anchor with hook	ETA	Steel 35CrMo	Hot-dip zinc	M6-M16
9	Wedge anchor with eye	ETA	Steel 35CrMo	Hot-dip zinc	M6-M16

No.	Description	Standard	Material	Coating	Sizes
10	Wedge anchor for hollow blocks	ETA	Steel 35CrMo	Hot-dip zinc	M6-M16

Table 8. High-Tensile Fasteners (HV) — Full Range

No.	Description	Standard	Strength	Material	Coating	Sizes
1	High-strength structural bolt	EN 14399-4	10.9	Steel 35CrMo	Geomet	M12-M36
2	High-strength bolt with enlarged head	EN 14399-3	10.9	Steel 35CrMo	Geomet	M12-M36
3	High-strength nut	EN 14399-4	10	Steel 35CrMo	Geomet	M12-M36
4	High-strength flat washer	EN 14399-5	—	Steel 45	Geomet	M12-M36
5	High-strength taper washer	EN 14399-6	—	Steel 45	Geomet	M12-M36
6	ASTM A325 structural bolt	ASTM A325	A325	Alloy steel	Geomet	1/2"-1 1/2"
7	ASTM A490 structural bolt	ASTM A490	A490	Alloy steel	Geomet	1/2"-1 1/2"
8	ASTM A194 heavy hex nut	ASTM A194	2H	Steel	Geomet	1/4"-4"
9	High-strength stud bolt B7	ASTM A193	B7	Steel 4140	Geomet, Xylan	1/2"-4"
10	High-strength stud bolt L7	ASTM A320	L7	Steel 4140	Geomet	1/2"-4"

Inspector Checklist: Anchors and High-Tensile Fasteners

Table 9. Visual Inspection — Anchors

No.	Parameter	Criteria	Method
1	Shank cracks	None	10x magnifier, UT
2	Anchor plate cracks	None	10x magnifier
3	Thread burrs	None	Visual
4	Coating uniformity	No skips	Visual
5	Wedge geometry	Per drawing	Template

No.	Parameter	Criteria	Method
6	Strength class stamp	Legible	Visual
7	Rust traces	None	Visual

Table 10. Dimensional Inspection — Anchors

No.	Parameter	Tool	Tolerance
1	Overall length	Caliper	js15
2	Shank diameter	Micrometer	h13
3	Thread pitch	Go/No-Go gauges	6g
4	Thread length	Caliper	±2 mm
5	Anchor plate size	Caliper	h14
6	Wedge angle	Template	±1°
7	Anchor plate thickness	Micrometer	js15

Table 11. Dimensional Inspection — High-Tensile Fasteners HV

No.	Parameter	Tool	Tolerance
1	Bolt length	Caliper	js15
2	Shank diameter	Micrometer	h13
3	Wrench size	Caliper	h14
4	Head height	Caliper	js15
5	Thread pitch	Go/No-Go gauges	6g
6	Thread length	Caliper	±2 mm
7	Wrench opening	Caliper	H14

Table 12. Mechanical Testing — Anchors and HV

No.	Parameter	Method	Standard	Requirement
1	Bolt 10.9 hardness	Rockwell HRC	ISO 6508	32-39 HRC
2	Bolt 12.9 hardness	Rockwell HRC	ISO 6508	39-44 HRC
3	Tensile strength	Tensile machine	ISO 898-1	Minimum per table
4	Anchor load capacity	Pull-out from concrete	ETA	≥ stated value
5	Impact toughness	Pendulum impact tester	ISO 148	For temperatures below -20°C
6	Proof load test	Hydraulic press	EN 14399	1.5 x working load

Table 13. Coating — Anchors and High-Tensile Fasteners

No.	Parameter	Method	Norm
1	Hot-dip zinc thickness	Thickness gauge	50-80µm
2	Geomet thickness	Eddy current	8-15µm
3	Xylan thickness	Eddy current	20-40µm
4	Salt spray hot-dip zinc	ASTM B117	500-1000 hours
5	Salt spray Geomet	ASTM B117	1000-1500 hours
6	Coating adhesion	Hammer impact	No flaking

Manufacturing Geography

Table 14. Production Clusters for Anchors and HV

No.	Region	Cities	Specialization
1	Hebei	Yongnian, Handan	High-tensile fasteners 10.9-12.9, anchor bolts
2	Shandong	Jinan, Qingdao	Anchor bolts, foundation studs
3	Zhejiang	Haiyan, Ningbo	Standard anchors, wedge anchors
4	Jiangsu	Suzhou	Stainless anchors AISI 316

Comprehensive sourcing and procurement selects inspectors with construction fastener experience. Complex engineering systems ensures supply for construction projects.

FAQ: Anchors and High-Tensile Fasteners Inspection

Q1: What is an ETA certificate and is it required for anchors?

A: ETA (European Technical Assessment) is a European technical evaluation confirming anchor load capacity in concrete. Mandatory for EU shipments. For North America, Middle East, Asia-Pacific — not mandatory but recommended as quality confirmation. Alternative: pull-out test protocol from accredited laboratory on concrete C25.

Q2: How to verify anchor load capacity without a laboratory?

A: Full verification requires a laboratory with hydraulic press and concrete samples. However, basic assessment can be done at the factory: 1) check wedge geometry with template; 2) measure anchor plate thickness with micrometer; 3) check thread pitch Go/No-Go; 4) conduct hardness test. These parameters correlate with load capacity. For critical applications — only laboratory testing.

Q3: Why cannot high-tensile fasteners (HV) be hot-dip galvanized?

A: Hot-dip galvanizing at 450°C causes hydrogen embrittlement in steel with tensile strength above 1000 MPa (10.9, 12.9, B7). This reduces impact toughness by 50-70% and can lead to brittle fracture. For HV,

use Geomet, DACROMET, or Xylan — coatings below 300°C. Verify coating type in the certificate.

Q4: Which anchor to choose for hollow blocks?

A: For hollow blocks (aerated concrete, hollow brick) use anchors with expansion sleeve or chemical anchors. Wedge anchors do not work in hollow blocks — the wedge hits the void instead of solid concrete. Verify anchor type in the project specification.

Q5: What is Geomet and how is it better than DACROMET?

A: Geomet is a chromium-free coating based on zinc and aluminum with inorganic binders. Advantages over DACROMET: 1) higher corrosion resistance (1000-1500 hours salt spray); 2) better chemical resistance; 3) thinner coating with same protection (8-15µm). Used in automotive and for critical structures.

Q6: How to control chemical anchor quality?

A: Chemical anchor (injection type) consists of a stud and cartridge with polyester or vinyl ester resin. Check: 1) resin shelf life (usually 12-18 months); 2) resin viscosity (must not be dried out); 3) correct component ratio; 4) mixture color (uniformity). The stud is checked as a standard threaded rod. Pull-out tests — 24 hours after installation.

Q7: What documents are required for high-tensile fasteners in construction?

A: Mandatory package: EN 14399 or ASTM A325/A490 compliance certificate, mill test certificate (chemical and mechanical), coating certificate, proof load test protocol. For EU: CE marking if applicable. For USA: ICC-ES evaluation report. For bridge construction — additional UT and MT protocols.

Q8: Why is an anchor bolt 8.8 more expensive than a standard 8.8 bolt?

A: Anchor bolt 8.8 requires: 1) more precise conical end geometry; 2) mandatory hot-dip galvanizing (electrolytic is unacceptable); 3) load capacity certification; 4) additional pull-out testing. Standard bolt 8.8 — only hardness and dimensions. Anchor bolt — comprehensive verification.

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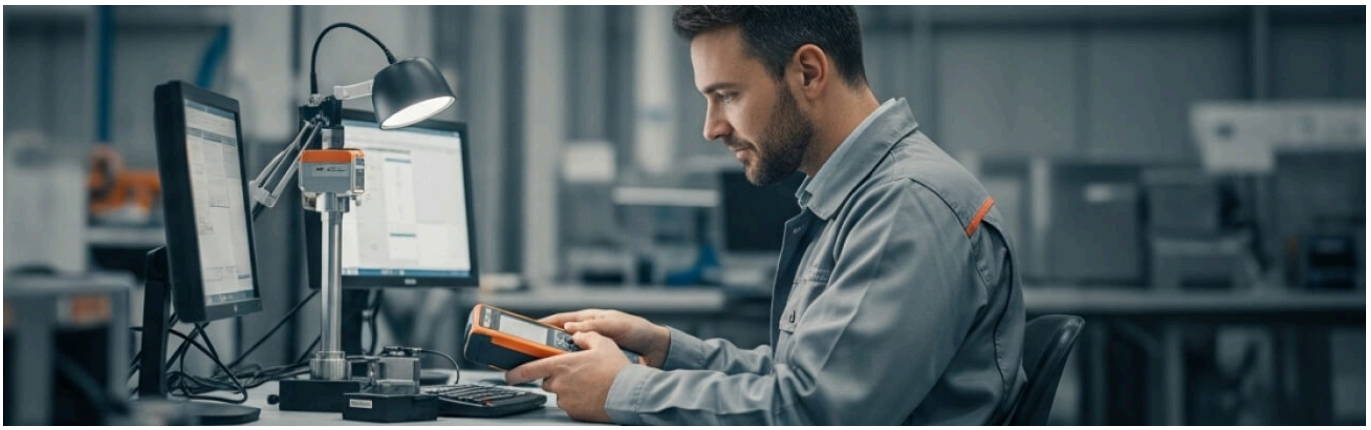
Contact Information:

- Client Relations Department:
- WhatsApp: +86 132 50100874
- Telegram: @China_metal_supply
- Email: zakaz@metal-asia.pw
- Official Website: www.metal-asia.pw



Order anchors and high-tensile fasteners inspection in China

Article Author: Milosh Kovachevic Supply Chain Manager: Metal-Asia