4130 Sucker Rod Inspection and Traceability Checklist

API 11B Rod Pumping Reference | Material Verification, Thread Control, Coupling Match and Record Chain

Technical purpose

This checklist connects AISI 4130 sucker rod material identity with finished-rod acceptance records. It focuses on what should be verified on the rod body, threaded end, coupling interface and document chain before the rod is treated as a traceable API 11B rod-string component.

Inspection scope overview

Control Area	Main Check	Record Evidence
Material identity	AISI 4130/4130M chemistry, heat number and alloy family	MTC, heat analysis, rod marking
API grade strength	Finished rod tensile strength against API 11B grade range	Tensile test report, grade marking
Heat treatment	Q&T;/heat treatment condition and hardness consistency where required	Heat treatment record, hardness log
Thread and pin end	Thread profile, shoulder condition, pin surface and coupling engagement	Thread inspection record, gauge status
Rod body condition	Straightness, OD, surface marks, laps, cracks or handling damage	Dimensional record, visual/NDT report
Coupling match	Coupling size, type, grade and thread compatibility	Coupling certificate, lot map
Final traceability	Finished rod marking linked to heat, test and packing records	Packing list, bundle tag, shipment docs

Traceability logic

A 4130 sucker rod should be reviewed as a finished rod-string component. The steel heat, API 11B grade, heat treatment, mechanical test, thread inspection, coupling match and bundle marking should all point to the same rod identity.

Data basis

API 11B covers sucker rods and rod-related products. Current API notices identify the 28th edition as published, with program effective date information for licensed facilities. API 11B quality-control language also requires acceptance equipment calibration and verifiable inspection records.

Article-use note: this PDF is a checklist reference, not a replacement for the current API 11B text or project-specific ITP.

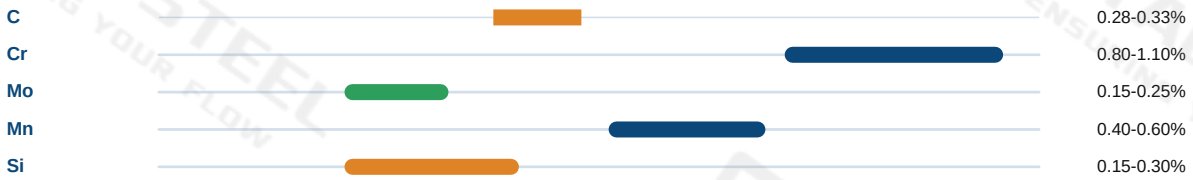
Material and Mechanical Verification Data

Chemical composition confirms alloy identity; API grade and test records confirm finished sucker rod strength.

AISI 4130 composition checkpoints

Element	Typical Range	Inspection Meaning
C	0.28-0.33%	Strength and hardness response after heat treatment
Cr	0.80-1.10%	Hardenability and through-section strength consistency
Mo	0.15-0.25%	Temper resistance and strength stability
Mn	0.40-0.60%	Strength contribution and steelmaking control
Si	0.15-0.30%	Deoxidation and minor strength contribution
P / S	Controlled residuals	Low residuals support toughness and fatigue behavior

Main alloy range



API 11B grade strength reference

Grade	Common Tensile Range	Record Check
C	90,000-115,000 psi	Finished rod tensile result and grade marking
K	90,000-115,000 psi	Strength range plus corrosion-service review
D	115,000-140,000 psi	Higher strength range; verify heat treatment and test results

Key control point

4130 is a material designation. API 11B grade defines the finished rod strength category. The material heat, heat treatment record and mechanical test report should be read together before accepting the rod identity.

Minimum record package

Record	Purpose
Heat analysis	Confirms AISI 4130/4130M chemistry
Tensile test	Confirms API grade strength range
Hardness review	Checks heat-treatment consistency where required
Thread inspection	Confirms pin-end profile and make-up reliability
Marking / packing list	Links rods, couplings and bundles to the same lot

Rod Body, Thread and Coupling Checklist

The threaded end and coupling interface are fatigue-sensitive zones; inspection should not stop at rod-body tensile strength.

Inspection Item	Recommended Technical Check	Why It Matters
Rod body straightness	Straightening record and dimensional check across rod length	Bending or runout can increase local stress during reciprocating movement
Surface condition	Visual inspection; NDT where specified for transverse/longitudinal defects	Surface marks can become fatigue initiation sites
Pin-end thread profile	Thread form, root/crest condition, start thread and visual damage check	Thread roots carry repeated load transfer through coupling engagement
Shoulder and end face	Shoulder contact surface, squareness and damage review	Poor contact can cause uneven load transfer and make-up issues
Coupling compatibility	Size, grade/type, full-size or slim-hole match, thread fit	Wrong coupling match can cause connection wear or premature fatigue
Gauge control	Thread gauge identity, calibration status and use within calibrated range	Acceptance results depend on controlled measuring and gauging equipment
Hardness consistency	Hardness review where required after heat treatment	Supports uniform heat-treatment response and grade stability
Protection and packing	Thread protectors, bundle tags, packing list and lot separation	Maintains identity and protects pin/coupling surfaces during handling

NDT / visual inspection note

Sucker rod production controls may combine straightening, full-surface visual/NDT checks and internal ultrasonic review. Final scope should follow API 11B, the project ITP and release requirements.

Connection reliability note

Thread form, shoulder condition and coupling match should be checked as one interface. A good rod-body tensile result does not remove the need for pin-end and coupling verification.

Traceability Chain and Release Risk Map

A clear rod identity links material heat, test record, thread inspection, coupling match and bundle marking.

Steel heat → Chemistry → Heat treatment → Mechanical test → Thread check → Coupling match → Rod marking → Packing docs

Traceability release checklist

Traceability Point	Required Link
Rod marking	Rod size, grade and identity should match inspection records
Heat / lot number	Connects physical rods with chemistry and heat treatment records
MTC / MTR	Summarizes chemistry and mechanical properties by heat or lot
Mechanical tests	Tensile/yield result and elongation against grade requirement
Thread inspection	Pin-end profile, shoulder condition and gauge-based acceptance
Coupling record	Coupling size/type/grade matched with rod string interface
Packing list	Bundle number and quantity linked to marking and documents
Shipment documents	Final document set aligned with shipped bundle identity

Common release risks

Risk	Control Action
Material-grade confusion	Separate AISI 4130 material identity from API 11B grade strength
Heat number mismatch	Match rod marking, MTC, test report and packing list
Thread/coupling mismatch	Verify thread profile, coupling type and grade before release
Unclear test scope	State tensile, hardness, NDT/visual and thread checks in ITP
Bundle identity gap	Use bundle tags and packing list mapping to preserve lot traceability

Document focus

Strongest trust signal: rod marking -> heat number -> MTC/MTR -> heat treatment -> tensile/hardness -> thread inspection -> coupling match -> packing list.