API 11B Grade D Alloy and AISI 4142M

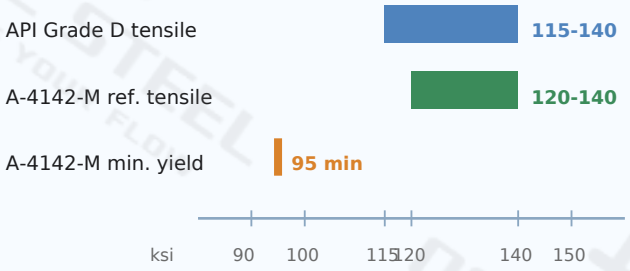
Strength Control Sheet for Sucker Rod 4142

This technical sheet summarizes how AISI 4142M material identity, API 11B Grade D Alloy strength control, heat treatment, mechanical testing and finished-rod traceability should be reviewed for Sucker Rod 4142.

Technical Identity	Reference Data / Control Point	Meaning for Finished Rod Review
Material route	AISI 4142M / A-4142-M; chromium-molybdenum alloy steel	Defines the Cr-Mo chemistry basis, not the finished API grade by itself.
API grade direction	API 11B Grade D Alloy	Finished sucker rod grade category; must be supported by test records.
API Grade D tensile range	115,000-140,000 psi	Common finished Grade D tensile-strength envelope for sucker rods.
4142M reference direction	120-140 ksi tensile; 95 ksi min. yield (public datasheet reference)	Useful for 4142M Grade D Alloy review; final values depend on MTC and specification.
Core verification	MTC + heat treatment + mechanical test + thread/coupling inspection + marking	Confirms the rod as a finished API 11B product, not only a steel material.

Strength envelope reference (ksi)

Data must be verified by MTC and finished mechanical test records.



Key Reading

AISI 4142M is the material route. API 11B Grade D Alloy is the finished rod strength identity. A rod marked as 4142M should still be checked through finished mechanical test results, heat-treatment evidence and traceability records.

Critical distinction: chemistry supports the strength response; the tensile/yield test confirms the finished rod.

Reference basis

Public sucker rod datasheets identify A-4142-M as a chromium-molybdenum alloy steel under API Grade D Alloy and list reference tensile/yield values for normalized and tempered rods. API Grade D tensile range is commonly listed as 115,000-140,000 psi. Final acceptance should follow the applicable API 11B requirement, project specification and actual MTC.

Material-to-Strength Control Matrix

For AISI 4142M sucker rod, strength control starts with chemistry but is completed only after heat treatment, mechanical testing and connection review. The table below separates the material basis from the finished-rod evidence.

Control Area	Reference Data / Check Item	Strength-Control Meaning
Carbon	0.38-0.45%	Higher-carbon Cr-Mo route; supports strength and hardness response after heat treatment.
Chromium	0.80-1.20%	Improves hardenability and strength consistency through the rod section.
Molybdenum	0.15-0.25%	Supports hardenability, temper resistance and strength stability.
Mn / Si	Mn approx. 0.50-1.00%; Si approx. 0.15-0.37%	Supports steelmaking control, deoxidation and secondary strength contribution.
Residuals	P / S controlled; typical max values appear around 0.025-0.035%	Lower residual levels help protect toughness and fatigue behavior.
Heat treatment	Normalized and tempered or specified project route	Converts alloy chemistry into controlled final strength and toughness response.
Mechanical testing	Tensile, yield, elongation and hardness where required	Verifies the finished rod meets the Grade D Alloy strength requirement.

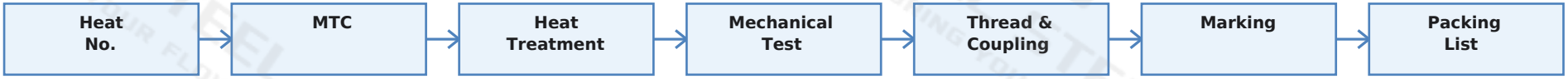
Mechanical record should prove	Documents should stay consistent
• Tensile strength within the required finished-rod range. • Yield strength and elongation recorded where specified. • Hardness review where required by grade or ITP. • Heat treatment route linked to the tested lot.	• Heat number on MTC matches rod marking. • Mechanical test record matches grade and size. • Thread/coupling release matches finished product identity. • Packing list and bundle identity match the shipment records.

Practical note

AISI 4142M should not be accepted only by chemical composition. For finished Grade D Alloy sucker rods, the strength check should match the MTC chemistry, heat-treatment route and finished mechanical test result. If tensile strength, yield strength, hardness review and rod marking are consistent, the product can be verified as a finished API 11B Grade D Alloy sucker rod.

Finished Rod Verification Chain

Finished Sucker Rod 4142 verification should connect material identity, strength evidence and connection release in one traceable chain. This is especially important where rod load, torque transfer, pin-end fatigue and coupling wear are service-sensitive factors.



Verification Point	Control Question	Acceptance Meaning
Material identity	Does the MTC chemistry match AISI 4142M / Grade D Alloy records?	Confirms that the rod is not a generic steel item.
Strength identity	Do tensile, yield, elongation and hardness records support the required grade?	Confirms finished mechanical performance after heat treatment.
Heat treatment	Is the heat-treatment route tied to the tested heat or lot?	Prevents chemistry-only acceptance without process evidence.
Thread and coupling	Do pin end, thread root, shoulder and coupling type match the rod string requirement?	Controls fatigue-sensitive connection areas and tubing clearance.
Traceability	Do MTC, marking, bundle identity and packing list point to the same rod?	Keeps technical records aligned through release and shipment.

Common Misread	Risk	Better Review
Treating 4142M as the API grade	Material route and finished strength identity become mixed.	Link AISI 4142M with API 11B Grade D Alloy and mechanical records.
Checking chemistry only	Strength may be assumed without finished test evidence.	Review MTC, heat treatment, tensile/yield and hardness records together.
Ignoring connection inspection	Thread/coupling fatigue risk may be missed.	Check pin end, thread root, shoulder area and coupling match.
Losing heat-lot continuity	Rod marking, MTC and packing list may not support release.	Match heat number, rod marking, bundle ID and packing list.

Final control rule

The strongest evidence for API 11B Grade D Alloy and AISI 4142M strength control is a consistent record set: heat number, MTC, heat treatment record, mechanical test, thread/coupling inspection, rod marking and packing list all pointing to the same finished sucker rod.