



G105 and S135 Drill Pipe Selection by Strength and Service Demand

API 5DP grade selection for well depth, load, torque, fatigue and connection review



SERVICE-DEMAND SCALE (INCREASING DEMAND →)



G105

Typical Application Window



S135

Typical Application Window



G105 Drill Pipe

- Higher strength than X95
- 105 ksi minimum yield strength
- Controlled high-load drilling
- Medium-to-deep wells
- Directional and build-and-hold sections
- Balanced strength and supply practicality
- Review fatigue, connection and drift records

S135 Drill Pipe

- Higher-strength option
- 135 ksi minimum yield strength
- Deep and ultra-deep wells
- Extended-reach drilling
- High torque and high suspended load
- Higher tensile margin
- Review hardness, tool joint condition and traceability documents



TECHNICAL NOTE

Grade selection should not be based on grade name alone. Review well depth, tensile load, torque, fatigue exposure, connection type, tool joint dimensions and inspection records together.

TYPICAL SELECTION WINDOW

Application / Condition	G105 Commonly Reviewed	S135 Commonly Reviewed	Review Comment
Medium-to-deep wells	✓	✓	G105 suitable in most cases; S135 as depth and load increase.
Directional sections	✓	✓	Evaluate side load, dogleg severity and fatigue exposure.
Build-and-hold intervals	✓	✓	Assess bending fatigue, rotation and connection makeup.
Extended-reach drilling	—	✓	S135 preferred for ERD and long, high-stress strings.
High-torque drilling	✓	✓	Consider torque margin, tool joint OD, and make-up capacity.
Mixed-string / replacement orders	✓	✓	Match existing string grade, connection type and dimensions.



A stronger grade does not replace connection matching, fatigue control or document verification.

G105 Drill Pipe for Controlled High-Load Drilling

Balanced strength increase for medium-to-deep wells, directional sections and controlled high-load service



G105 Grade Position



Minimum Yield Strength 105,000 psi / 724 MPa



Maximum Yield Strength 135,000 psi / 931 MPa



Minimum Tensile Strength 115,000 psi / 793 MPa



Higher strength than X95

Typical G105 Review Conditions



Medium-to-deep wells



Directional wells



Build-and-hold intervals



Controlled high-load drilling



Mixed-string / replacement orders



Common G105 Risk Points

Slip marks

Corrosion pits

Hardbanding defects

Thread shoulder damage

Upset transition area

These areas can act as fatigue initiation points under cyclic bending and torsional loads. Careful inspection and maintenance are essential.

Why G105 Is Commonly Reviewed

Condition	Main Review Point	Practical Comment
Deeper vertical wells	Higher axial load and collapse demand	G105 increases margin over X95 for greater depth.
Directional wells	Bending fatigue and dogleg severity	Provides better fatigue margin for tighter tolerances.
Build sections	Combined tension, torque and bending	Maintains balanced performance in build-and-hold.
Replacement strings	Compatibility and matching grades	G105 suits X95 replacement without over-specification.
Balanced strength selection	Adequate margin without over-grading	G105 adds strength where needed, without S135 cost.

Typical G105 Specification Review



OD
Outside
Diameter



Nominal
Weight
lb/ft



Wall
Thickness
Nominal



Range
Min / Max



Upset
Type
IF / EI



Connection
Type
API 5DP



Tool Joint
OD / ID
Verify



Drift
Diameter
Go / No-Go



Hardbanding
Condition
OD Check



Inspection
Class
Per Spec



G105 is often selected when X95 leaves limited margin but the full drilling program does not require S135.



S135 Drill Pipe for Deep and High-Torque Wells

Higher pipe-body strength for deep wells, extended-reach drilling and higher load margin



S135 Grade Position



Minimum Yield Strength: **135,000 psi / 931 MPa**
 Maximum Yield Strength: **165,000 psi / 1138 MPa**
 Minimum Tensile Strength: **145,000 psi / 1000 MPa**



Higher-strength option for more demanding wells

Typical S135 Review Conditions



Deep and ultra-deep wells



Extended-reach drilling



High-torque drilling and reaming



High suspended load / overpull margin



Complex directional wells

Why S135 Is More Strongly Reviewed

Condition	Main Review Point	Practical Comment
Ultra-deep wells	Tensile and yield strength retention	Higher loads and greater fatigue exposure.
Long horizontal sections	Buckling, ovality and wear	Long exposures increase risk and require tighter control.
High-torque drilling	Torque and connection shear	Higher torsional demand and connection shear.
Stuck-pipe recovery / overpull	Tensile and connection margin	Overpull events require higher load margin verification.
Severe dogleg / long build sections	Bending, fatigue and make-up	Bending, fatigue and make-up stress are higher.
When G105 leaves insufficient margin	Strength margin to limit state	S135 provides additional strength margin for safety.

Common S135 Review Risks

- fatigue exposure
- sour-service / H₂S risk
- friction weld quality
- thread condition
- tool joint performance
- hardness and toughness control

Higher strength requires closer review of hardness, connection condition and traceability.

Typical S135 Specification Review

1. Pipe Size	2. Nominal Weight	3. Wall Thickness	4. Range	5. Upset Type	6. Connection	7. Tool Joint OD/ID	8. Drift Requirement	9. Make-up Torque	10. Inspection Standard	11. Document Package
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S135 improves strength margin, but it should not be treated as an automatic upgrade.



Application Window and Mechanical Strength Comparison

Comparing service window, minimum mechanical strength and review logic under API 5DP



TYPICAL APPLICATION WINDOW			
Application	G105 (105 ksi Grade)	S135 (135 ksi Grade)	Review Guidance
Medium-to-deep wells	●	⊙	G105 for most cases; S135 as depth and load increase.
Directional wells	●	⊙	Evaluate side load, dogleg severity and fatigue exposure.
Extended-reach drilling	○	⊙	S135 preferred for ERD and long, high-stress strings.
High-torque drilling	○	⊙	Consider torque margin, tool joint OD, and make-up capacity.
Mixed-string / replacement orders	●	⊙	Match existing string grade, connection type and dimensions.

● Well suited ○ Possible with review ⊙ Preferred choice

STRENGTH AND SERVICE NOTES	
	Higher strength is not the only selection factor
	Torque, fatigue and connection control matter
	Tool joint condition affects field acceptance
	H ₂ S exposure requires additional review
	MTC and inspection records must be traceable

Grade	MINIMUM MECHANICAL STRENGTH					
	Minimum Yield Strength		Maximum Yield Strength		Minimum Tensile Strength	
	psi	MPa	psi	MPa	psi	MPa
G105	105,000	724	135,000	931	115,000	793
S135	135,000	931	165,000	1,138	145,000	1,000



G105 is often the balanced choice. S135 is selected when higher load or torque margin is required.

Specification and Field Acceptance Review

Key review points for matching the drill pipe joint, controlling fatigue and verifying documents



G105 Review Focus

- More strength than X95 without moving directly to S135
- Medium-to-deep wells and directional sections
- Build-and-hold intervals and controlled high-load drilling
- Common review points: fatigue, connection compatibility, drift and mixed-string matching
- Common risk points: slip marks, corrosion pits, hardbanding defects, thread shoulder damage, upset transition area

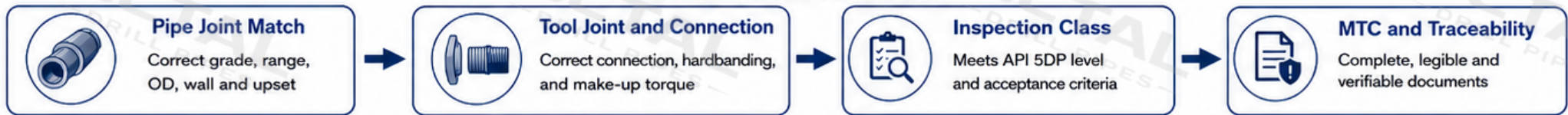
S135 Review Focus

- Higher-strength option for more demanding wells
- Deep and ultra-deep wells
- Extended-reach drilling and high-torque reaming
- Common review points: toughness, hardness, tool joint condition, make-up torque and traceability documents
- Common risk points: fatigue exposure, sour-service risk, friction weld quality, thread condition and tool joint performance

SPECIFICATION REVIEW ITEMS

Specification Review Items	Why It Matters	Typical G105 Review	Typical S135 Review
OD	Ensures proper clearance and tool compatibility	Verify to spec	Verify to spec (tighter tolerance)
Nominal Weight	Confirms standard weight and load rating	Verify to spec	Verify to spec
Wall Thickness	Controls strength and collapse resistance	Verify to spec	Verify to spec (tighter tolerance)
Range	Ensures joint matches program requirements	Match range	Match range (consider higher rating)
Upset Type	Affects strength, fatigue and stress transition	Verify to spec	Verify to spec (premium / optimized)
Connection	Critical for make-up integrity and compatibility	Match connection	Match connection (verify premium options)
Tool Joint OD / ID	Ensures tool compatibility and flow area	Verify dimensions	Verify dimensions (tighter tolerance)
Drift Requirement	Confirms internal drift for tool passage	Go / No-Go per API 5DP	Go / No-Go per API 5DP (tight drift)
Hardbanding	Protects connections and reduces wear	Verify OD and length	Verify OD, length and quality
Make-up Torque	Ensures proper preload without over-torque	Verify minimum and maximum	Verify (typically higher control)
Inspection Standard	Defines inspection class and acceptance criteria	API 5DP (PSL as specified)	API 5DP (PSL 2 or as specified)
Document Package	Provides traceability and compliance	MTC, Heat No., Test Reports, Drift, Torque	Full package incl. MTC, HIC/SSC if sour, Torque

FIELD ACCEPTANCE DEPENDS ON



The grade name is only one part of the technical description. Field acceptance depends on whether the complete drill pipe joint matches the drilling program and required inspection records.