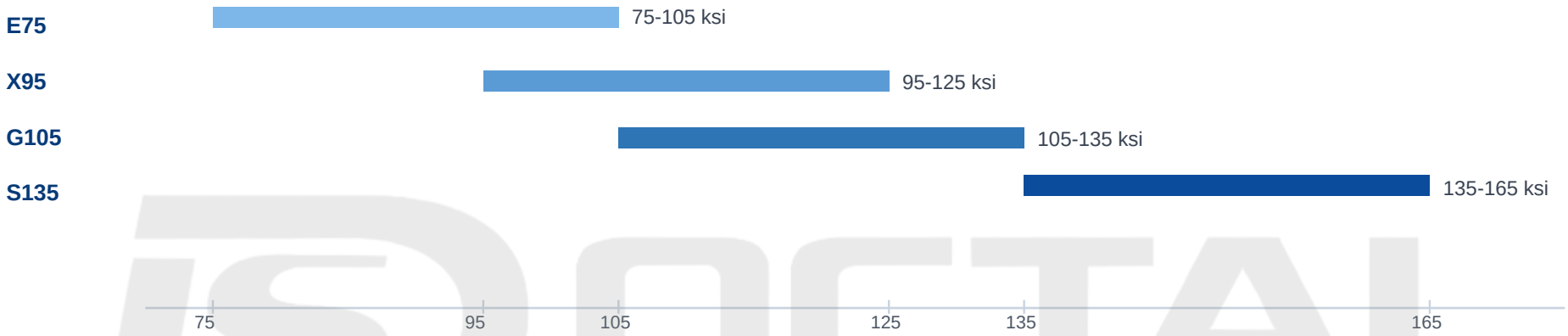
API 5DP Drill Pipe Grades and Mechanical Strength Reference

API 5DP grades form the standard strength ladder before any special material route is reviewed.

This reference summarizes standard API drill pipe grade strength, chemical residual limits, tool-joint mechanical requirements, CVN impact references and length ranges. Final acceptance should follow the applicable API 5DP edition, project specification, approved technical datasheet and MTC.

Yield Strength Windows (ksi)

Grade number = minimum yield strength in ksi



1. Pipe Body Mechanical Properties by API 5DP Grade

API 5DP Grade	Min Yield Strength	Max Yield Strength	Min Tensile Strength	Yield Window	Engineering Meaning
E75	75 ksi / 517 MPa	105 ksi / 724 MPa	100 ksi / 689 MPa	30 ksi	Baseline API grade for moderate drill-string tensile load.
X95	95 ksi / 655 MPa	125 ksi / 862 MPa	105 ksi / 724 MPa	30 ksi	Intermediate grade; reviewed where E75 strength is not enough.
G105	105 ksi / 724 MPa	135 ksi / 931 MPa	115 ksi / 793 MPa	30 ksi	Higher API grade for deeper or higher-load drilling margin.
S135	135 ksi / 931 MPa	165 ksi / 1138 MPa	145 ksi / 1000 MPa	30 ksi	Common high-strength API grade; still needs toughness, fatigue and tool-joint review.

Key reading: E75, X95, G105 and S135 are separated mainly by yield-strength window. Moving to a higher API grade improves tensile-load margin, but it does not replace separate review of impact toughness, fatigue behavior, sour-service control or tool-joint performance.

Additional Grade Review Data

API 5DP drill pipe should be reviewed as a complete assembly: pipe body, upset end, weld zone, tool joint, connection and traceability records.

2. Chemical Residual Limits

Product Element	Phosphorus, P max	Sulfur, S max	Review Meaning
Pipe body - Grade E	0.030%	0.020%	Residual-element control supports grade compliance and toughness behavior.
Pipe body - Grades X, G, S	0.020%	0.015%	Tighter P/S limits support higher-strength grade quality and toughness.
Tool joint	0.020%	0.015%	Tool-joint chemistry must support connection strength, hardness and impact review.

3. Tool Joint Tensile Requirements

Area	Yield Strength	Tensile Strength	Elongation	Why It Matters
Tool joint	827-1138 MPa (120-165 ksi)	>=965 MPa (>=140 ksi)	>=13%	Tool-joint performance must match pipe-body load and connection demand.

Length Range and Impact Toughness Reference

Length, toughness and connection-side data help keep grade strength in the correct field context.

4. Length Range Reference

Length Range	Inclusive Length, m	Approx. ft	Review Note
Range 1	6.10-7.01 m	20.0-23.0 ft	Shorter range; verify project requirement and final specification.
Range 2	8.84-9.75 m	29.0-32.0 ft	Common field range for many drilling programs.
Range 3	12.19-13.72 m	40.0-45.0 ft	Longer range; check handling, rig and logistics limits.

Note: length, size and connection details can vary by edition, order item and project specification; final acceptance should be checked against the applicable document and MTC.

5. CVN Impact Reference Values

Product Element	Average CVN - 10 x 10 mm	Single CVN - 10 x 10 mm	Technical Note
Drill-pipe body	100 J	80 J	Applies where CVN is required by grade / PSL / supplementary requirement.
Tool joint (box and pin)	54 J	47 J	Connection-side toughness is part of drill-pipe assembly review.
Weld zone	42 J	32 J	Weld-zone toughness helps evaluate the pipe body-to-tool-joint transition area.

Fatigue and Traceability Review

Grade strength does not close the review by itself. Impact toughness, weld-zone behavior, tool-joint matching and traceability records are part of the drill-pipe performance check.

6. What Strength Data Does Not Prove

Review Point	Strength Data Shows	Still Requires Separate Review
Load capacity	Yield and tensile strength define the first load boundary.	Torque, connection capacity and fatigue under rotation.
Grade selection	E75 to S135 forms the API strength ladder.	Well profile, dogleg severity, temperature and service environment.
Material acceptance	Mechanical properties confirm the grade range.	MTC, heat number, Charpy, hardness, NDT and tool-joint inspection.

Technical note
Grade strength is the first filter. Drill-string suitability still depends on OD / wall thickness, connection, dogleg severity, torque, fatigue risk, service temperature, sour-service condition and document traceability.

Traceability check
Pipe marking -> Heat number -> MTC -> Tensile test -> Charpy impact where required -> Hardness where required -> NDT -> Dimensional inspection -> Tool-joint / thread inspection -> Final release record.

Reference basis: public API 5DP / ISO 11961 technical text and multiple API 5DP drill pipe data references. This PDF is a quick engineering reference and not a substitute for the applicable standard edition, project specification or certified MTC.