

IU, EU and IEU Drill Pipe Quick Comparison Guide

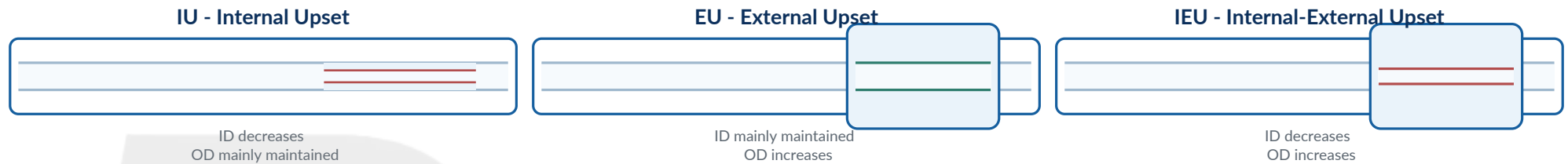
API 5DP Reference | Pipe-End Geometry, Hydraulic Path, Weld Support and Inspection Focus

Upset formation
Tube ends are locally heated and forged to thicken the wall before the tool joint is attached.

Weld support
Upset adds weld cross-sectional area where the pipe body and tool joint are mated.

110% reference
Engineering reference target: weld tensile strength at least 110% of pipe body yield strength.

API order item
Upset type must be specified as internal, external or internal-external upset with grade, size and connection.



Quick Geometry Comparison

Upset Type	Full Name	ID Change	OD Change	Main Engineering Effect	Primary Review Point
IU	Internal Upset	ID decreases	OD mainly maintained; minor external upset can still affect elevator fit	Adds internal wall thickness but restricts bore clearance and fluid path	Drift diameter, internal taper and tool passage
EU	External Upset	ID mainly maintained; minor internal upset can exist	OD increases more than IU/IEU of same tube size	Keeps a better internal flow path and supports weld area through outside wall growth	OD profile, elevator/bushing compatibility and weld area
IEU	Internal-External Upset	ID decreases	OD increases	Balances weld-zone support and hydraulic performance; common for drilling configurations	Both bore restriction and external transition profile

Key reading: IU, EU and IEU are pipe-end geometries. The practical change is not only the name of the upset; it is the local ID, OD, wall-thickness distribution, flow path and transition into the tool joint weld zone.

Data-Based Technical Notes and Inspection Focus

The upset area is a measurable geometry transition zone. Acceptance review should connect the specified upset type with bore clearance, OD profile, weld-zone support, hardness records and marking/document consistency.

Reference Point	Data / Requirement to Review
Order information	API 5DP / ISO 11961 order information includes document number, quantity, OD label, wall-thickness label, grade, upset type, RSC type, length/tolerance, inspection and documentation.
External-upset OD tolerance area	OD tolerance applies immediately behind the external upset for 127 mm / 5 in for sizes smaller than label 6-5/8; for label 6-5/8, the distance is approximately equal to the OD. Measurement is by calipers or snap gauges.
Weld-zone hardness limits	No surface hardness number above 37 HRC for Grades E, X, G and S; 40 HRC for Grade V; 32 HRC for SS grades. Through-wall mean hardness follows the same grade logic where applicable.
Hardness test methods	Hardness testing can reference ISO 6506-1 / ASTM E10, ISO 6507-1 / ASTM E92, and ISO 6508-1 / ASTM E18.

Performance Area	IU	EU	IEU
Drift / tool passage	Most restricted bore among the three types	Best bore clearance tendency	Reduced bore; must verify drift and tool passage
Fluid flow / pressure drop	Higher flow restriction tendency	Better internal flow path	Balanced, but not as open as EU
OD profile	Mostly near pipe body OD, with minor external upset	Largest OD increase	OD increase plus internal restriction
Weld-area support	Internal wall growth supports weld zone	Outside wall growth supports weld zone	Support on both sides of wall
Stress transition	Internal taper control is important	External transition smoothness is important	Both internal and external transitions require control

Inspection Points by Acceptance Risk

Inspection Item	Why It Matters	Upset-Type Sensitivity
ID and drift clearance	Confirms the bore does not restrict required drift, wireline tools or completion tools.	Higher sensitivity for IU and IEU
OD behind upset	Confirms outside profile and local OD tolerance near the upset transition.	Higher sensitivity for EU and IEU
Transition profile	Abrupt geometry change can increase local stress concentration and tool hang-up risk.	Important for all types
Surface condition	Forging folds, laps, cracks or sharp marks near the transition can become fatigue-sensitive sites.	Important for all types
Weld-zone records	Hardness, NDT and weld-area support records connect the upset geometry to final acceptance.	Important for all types
Marking and documents	Upset type, grade, size, connection and length must match MTC, inspection records and packing list.	Important for shipment release

Practical note: Checking grade alone is not enough. The same grade and OD can have different pipe-end geometry, bore clearance and OD transition depending on whether the body is IU, EU or IEU.

Worked Example and Selection Notes

Example based on a 5 in API 5DP G105 R2 IEU drill pipe configuration. Values should be verified against the purchase order, MTC, inspection records and final tool-joint design.

Item	Example Value	Review Meaning
Pipe body OD	127.00 mm / 5 in	Nominal pipe body size for size, connection and elevator review
Nominal designation weight	19.50 lb/ft (approx. 29.019 kg/m by conversion)	Weight designation for string design; actual calculated mass depends on configuration
Wall thickness	9.19 mm / 0.362 in	Defines pipe-body section and ID basis
Pipe body ID	108.61 mm / 4.276 in	Bore basis before reviewing upset and tool-joint restriction
Upset type	IEU - internal-external upset	Both ID reduction and OD increase need acceptance review
Tool joint OD	168.275 mm / 6-5/8 in	Affects elevator, slips, wear tables and OD clearance
Tool joint ID	82.55 mm / 3-1/4 in	Tool joint bore can become the controlling restriction
Connection	NC50 / 4-1/2 API IF, RH	Connection compatibility and make-up torque review
Minimum torsional strength	60,200 ft-lbs	Torque capacity reference for string design review
Minimum tensile strength	1,380,000 lbs	Tension capacity reference; verify against current design basis
Finished length	9.30 m to 9.45 m	R2-type finished length control including tool joints

Selection Question	Preferred Review Direction
Need the largest bore or lower internal flow restriction?	Review EU first, then verify OD profile and elevator/bushing compatibility.
Need a balanced drilling configuration with stronger wall support near the weld area?	Review IEU; it is common in drilling configurations but still requires drift and OD transition checks.
Need a slimmer outside profile or near-flush OD application?	Review IU, but control bore restriction and internal taper carefully.
Need the cleanest acceptance package?	Specify grade, OD, wall thickness, upset type, connection, tool-joint OD/ID, length, inspection scope, drift requirement and documentation in the PO.

Common Mistake	Better Control Point
Comparing IEU, EU and IU only by strength	Compare geometry, bore clearance, hydraulic behavior, OD transition and weld support together.
Ignoring tool-joint ID when discussing pipe-body ID	Tool joint ID can become the controlling bore restriction in actual tool passage.
Listing upset type without inspection scope	Add ID/OD checks, drift, transition profile, surface condition, hardness/NDT records and marking consistency.

Source references used for this guide: API Specification 5DP Addendum 1 (January 2025); API 5DP / ISO 11961 order-information requirements; Workstrings International Engineering Bulletin BLTN-016; Quail Tools drill pipe performance sheet; TeknaCorp API 5DP size table; public tender example for 5 in G105 R2 IEU drill pipe. This guide is a technical reference, not a substitute for the project purchase specification or final mill documents.