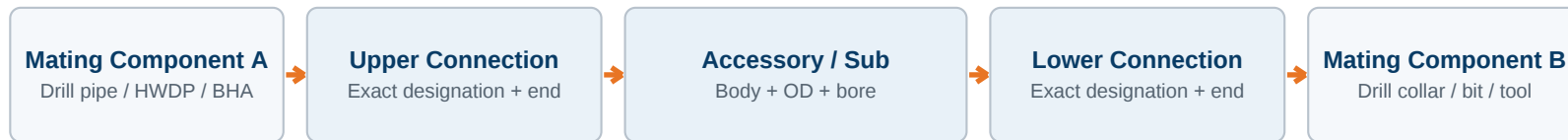


Drill String Connection Compatibility and Sub Selection Guide

Drill String Connection Compatibility

A drill string accessory is compatible only when the two mating interfaces and the accessory geometry are defined together. Connection orientation, outside diameter or product name by themselves do not establish interchangeability. Selection begins with the components above and below the accessory, then confirms the exact connections, bore and installation geometry.



Compatibility must be confirmed across the complete interface - not from OD or pin/box orientation alone.

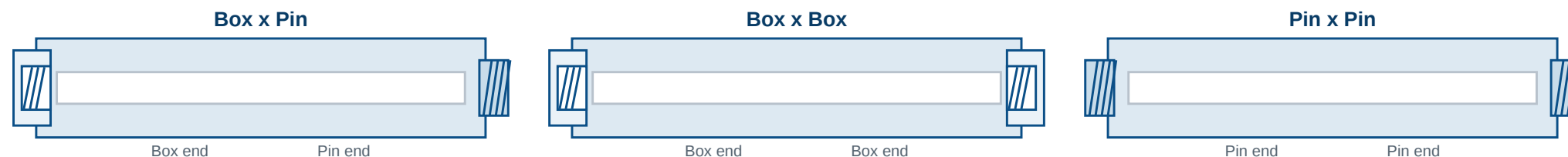
Compatibility checks

Connection Item	What Must Be Confirmed	Why It Matters
Upper Connection	Exact connection designation and pin/box end presented by the component above.	Defines the upper mating interface.
Lower Connection	Exact connection designation and pin/box end required by the component below.	Defines the lower mating interface.
Connection Family / Size	The actual rotary shouldered connection or project-specific connection at each end.	Prevents false matching based only on end orientation.
Shoulder Interface	Shoulder geometry and contact condition required by the mating connection.	Supports correct make-up and load transfer.
OD	Accessory outside diameter and adjacent-component clearance.	Controls external fit within the planned string.
ID / Bore	Minimum internal passage required by the drilling-fluid path and internal clearance.	Controls flow area and through-bore compatibility.
Overall Length	Required installed length within the drill-string or BHA layout.	Controls spacing and assembly stack-up.
Mating Components	Drill pipe, HWDP, drill collar, BHA tool, bit or rig-side equipment.	Links the accessory specification to the actual assembly.

Compatibility rule: function -> mating components -> upper/lower connections -> OD/bore/length -> approved drawing or applicable connection requirement.

Crossover Sub Connection Configurations

A crossover sub joins drill-string components that cannot connect directly. Each end must be specified for its actual mating connection; Box/Pin orientation alone does not define compatibility.



End orientation is only one part of compatibility. Exact connection designation, size, shoulder geometry and bore still require confirmation.

Configuration	What It Defines	What Still Must Be Specified
Box x Pin	A box end on one side and a pin end on the other.	Exact upper and lower connection designations, size, OD, bore, length and mating components.
Box x Box	Box connections on both ends.	The connection required at each box end; the two ends do not have to be the same connection family or size.
Pin x Pin	Pin connections on both ends.	The connection required at each pin end; shoulder and bore requirements must also match the assembly.

Critical distinction: Box x Pin, Box x Box and Pin x Pin describe end orientation only. They do not identify the connection family, thread size, shoulder geometry or interchangeability.

Interface logic

Component Above	Crossover Sub	Component Below
Drill pipe / HWDP / rig-side component	Upper connection A -> integral sub body and bore -> lower connection B	HWDP / drill collar / BHA tool / other mating component

Specify each end independently. After the two mating interfaces are defined, check OD, bore and overall length against the planned drill-string arrangement; body size or a general Box x Pin description is not enough.

Accessory Selection by Connection Requirement

Select the accessory by the duty required at its position in the string: connection adaptation, length adjustment, connection protection, bit connection or fluid control. Similar-looking subs are not functionally interchangeable.



Requirement	Accessory	Primary Selection Driver	Typical Position
Join two different connections	Crossover Sub	Exact upper and lower connections plus pin/box orientation.	Between drill pipe, HWDP, drill collar or BHA tools.
Adjust string length with a shorter section	Drill Pipe Pup Joint	Required length, matching drill-pipe connection, OD and bore.	Within the drill-pipe or work-string section.
Connect the lower BHA to the bit	Bit Sub	Upper BHA connection and specified bit connection.	Immediately above the drill bit.
Protect a top-drive connection from repeated cycling	Top Drive Saver Sub	Top-drive connection and drill-string connection.	Between top drive and drill string.
Protect the Kelly connection from repeated cycling	Kelly Saver Sub	Kelly-side and drill-string-side connections.	Between Kelly and drill string.
Introduce fluid through an auxiliary port	Pump-In / Side Entry Sub	Main end connections, auxiliary port, bore and pressure basis.	At a circulation or intervention point.
Provide internal drill-string flow shutoff	Kelly Valve	Connections, bore, valve configuration and pressure/service basis.	Kelly / upper drill-string assembly.

Selection boundary: crossover = connection adaptation; saver = connection protection; pup joint = length adjustment. Fluid-control accessories also require pressure/flow criteria.

Required Inputs Before Sub Selection

A usable sub specification must define the accessory within the actual drill-string assembly. The inputs below establish the two interfaces, geometry and service conditions needed for engineering review.

Required Input	What to State	Selection Purpose
Accessory Function	Connection adaptation, length adjustment, connection protection, bit connection, fluid inlet or flow shutoff.	Identifies the correct accessory family before dimensions are selected.
Component Above	Drill pipe, HWDP, top drive, Kelly, drill collar or BHA tool.	Defines the upper mating interface.
Component Below	Drill pipe, HWDP, drill collar, BHA tool, bit or other component.	Defines the lower mating interface.
Upper Connection	Exact connection designation and pin/box end.	Controls upper-end make-up.
Lower Connection	Exact connection designation and pin/box end.	Controls lower-end make-up.
OD	Required outside diameter or dimensional envelope.	Checks external clearance and adjacent component fit.
ID / Bore	Required internal passage / minimum bore.	Checks drilling-fluid path and internal clearance.
Overall Length	Installed length required by the drill-string or BHA layout.	Controls spacing and string configuration.
Pressure / Service Basis	State where applicable to pump-in, side-entry or valve products.	Adds the fluid-control requirement when the component is pressure-containing.
Applicable Drawing / Standard	Project drawing, approved connection data and applicable standard edition.	Provides the final dimensional and acceptance basis.

Verification sequence

1	Function	2	Interfaces	3	Geometry	4	Service	5	Final Basis
	Choose the accessory by the job it must perform.		Confirm both mating components and exact connections.		Check OD, bore and length.		Add pressure/flow requirements where relevant.		Check against the approved drawing and applicable standard.

Do not select a sub from one descriptor alone: OD only, Box x Pin only, material grade only or product name only. Final suitability depends on the complete connection and assembly definition.

Technical basis. API Spec 7-1 covers applicable rotary drill stem elements; API Spec 7-2 covers threading and gauging of rotary shouldered connections. Approved drawings, connection data and project requirements govern final selection.