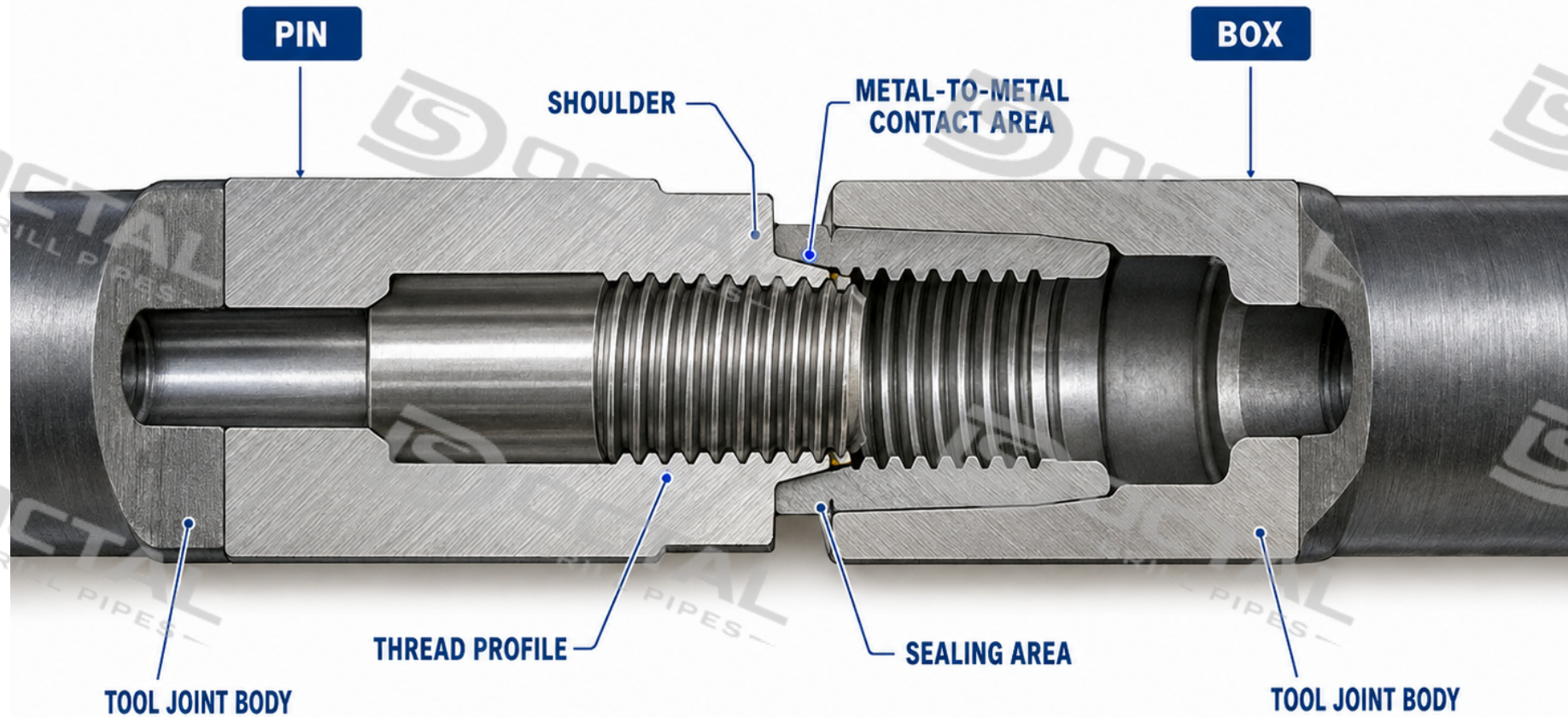


Rotary Shouldered Connection Structure in Drill String

Rotary shouldered connections provide high-strength, metal-to-metal load transfer and pressure sealing between drilling components.



The rotary shouldered connection transfers tensile, compressive, and torsional loads between drilling components with high efficiency.

HOW DRILL STRING CONNECTIONS TRANSFER LOADS DURING DRILLING

PIN SIDE

BOX SIDE

1 TORQUE TRANSFER

Rotational force is transferred through metal-to-metal contact at the shoulder.

SHOULDER CONTACT

Torque is transferred through the shoulder metal-to-metal contact.

2 TENSION LOAD

Axial tensile load is carried by the engaged threads and shoulder contact.

3 BENDING LOAD

Bending forces are resisted by the connection structure, shoulder, and thread engagement.

SEALING AREA

Sealing surfaces prevent fluid leakage under internal pressure.

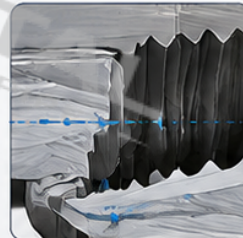
4 INTERNAL PRESSURE

Drilling fluid pressure is contained within the connection sealing area to ensure pressure integrity.

LOAD TRANSFER PATH

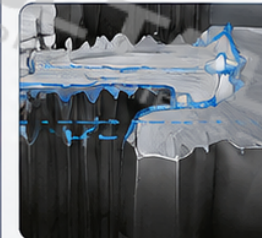
- Torque → Through shoulder contact
- Tension → Through thread engagement and shoulder
- Bending → Through connection structure
- Pressure → Through internal bore and sealing area

CONNECTION ENGAGEMENT



- Full thread engagement provides axial strength
- Shoulder contact provides torque capacity
- Combined design ensures reliable load transfer in all drilling conditions

PRESSURE CONTAINMENT AREA

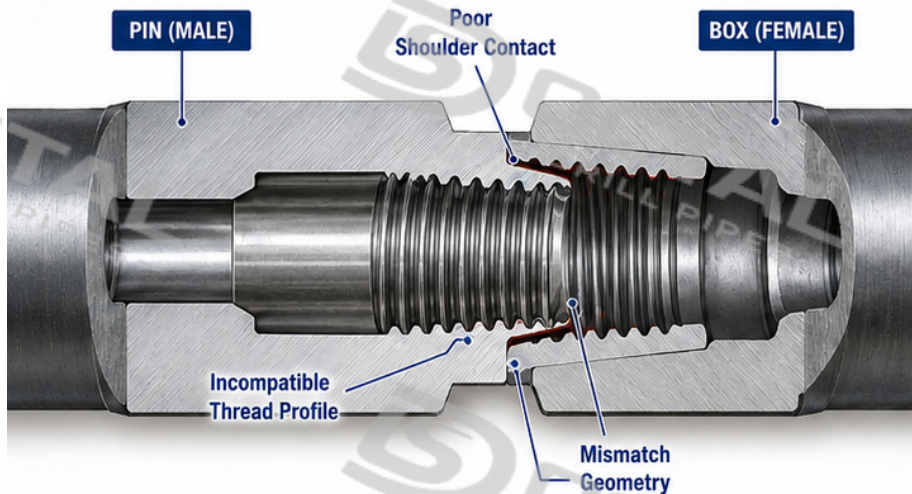


- Sealing area is designed to contain internal drilling fluid pressure
- Proper make-up ensures metal-to-metal seal and pressure integrity

CONNECTION COMPATIBILITY CONTROL FACTORS

Proper connection compatibility ensures reliable load transfer, pressure integrity, and drilling performance.

✗ INCORRECT CONNECTION MATCHING



GAUGE VERIFICATION

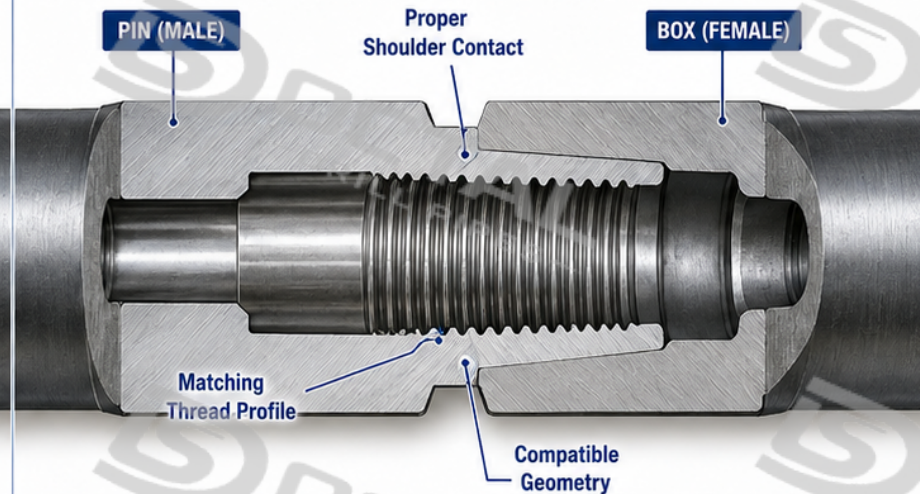


FAIL – NONCONFORMING

Connection fails go/no-go gauge verification.



✓ CORRECT CONNECTION MATCHING



GAUGE VERIFICATION



PASS – CONFORMING

Connection meets go/no-go gauge verification.



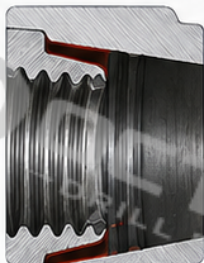
THREAD PROFILE



✗ Thread forms do not match, causing partial engagement and stress concentration.

✓ Matching thread profile enables full engagement and even load distribution.

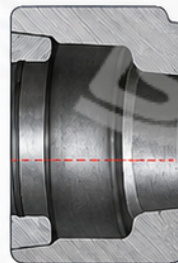
SHOULDER DESIGN



✗ Shoulder faces do not fully seat, reducing load transfer capacity.

✓ Shoulder faces seat completely, transferring axial and torsional loads efficiently.

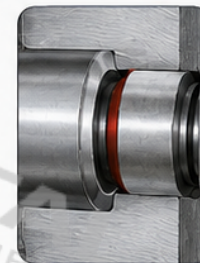
TOOL JOINT GEOMETRY



✗ Geometric mismatch causes misalignment and inconsistent load paths.

✓ Compatible geometry ensures alignment and consistent load transfer.

GAUGE VERIFICATION



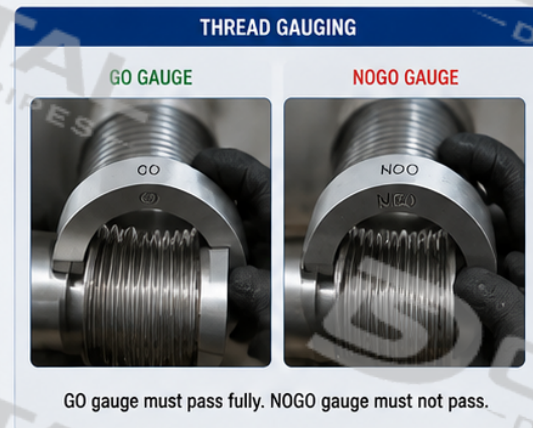
✗ Fails go/no-go gauge check, indicating nonconforming connection.

✓ Passes go/no-go gauge check, verifying conforming connection.

CORRECT CONNECTION COMPATIBILITY ENSURES MAXIMUM STRENGTH, SEALING INTEGRITY, AND RELIABLE DRILLING OPERATIONS.

CONNECTION INSPECTION AND VERIFICATION WORKFLOW

Systematic inspection and verification ensure connection quality, reliability and field performance.



INSPECTION RECORD EXAMPLE

Connection Type: NC50 Standard: API Spec 7-2
Size: 5 in Grade:

Inspection Item	Requirement	Result	Evaluation
Thread Gauging (GO)	Must Pass	Pass	✓
Thread Gauging (NOGO)	Must Not Pass	Not Pass	✓
Major Diameter	Per Spec	126.83 mm	✓
Shoulder Diameter	Per Spec	146.05 mm	✓
Thread Length	Per Spec	95.20 mm	✓
Visual Inspection	No Defect	Acceptable	✓

Inspector: QC-07 Date: 2024-05-20
Approved: [Signature] Date: 2024-05-20

Consistent inspection and verification of drill string connections ensure safe operation, optimal performance and reduced field risks.