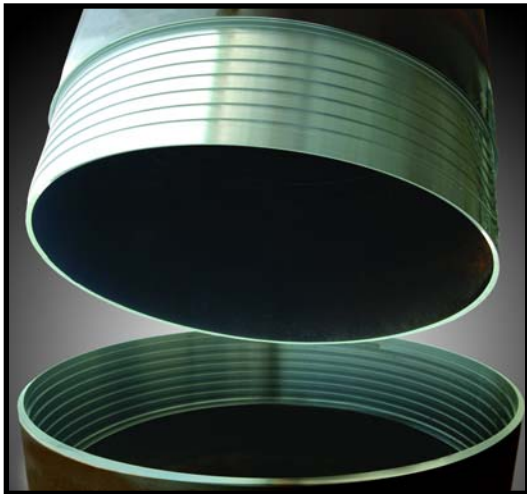


FRANK'S DOUBLE DRIVE SHOULDER CONNECTOR

U.S. PATENT #5810401

A Low Cost Solution to Conductor Make-up

Frank's, the industry leader in conductor technology, offers a low cost, high strength drivable connector, the Double Drive Shoulder Connector (DDS).



The connector can be cut on the pipe or cut on an 18" segment of pipe and then welded to the pipe body.

In order to achieve higher connector strength Frank's cuts the threads on X-70 grade material. This gives the customer the option of using grade B pipe and ensuring higher connector strength.



Threading of DDS Pin



DDS Characteristics

- Connector O.D. is flush with pipe O.D.
- Connector I.D. is flush with pipe I.D. on pipe wall thickness 1" or larger.
- Connector I.D. is near flush on pipe wall thickness less than 1" (unless threaded directly on pipe).
- Releasable, retrievable and re-usable after driving.
- Design allows drive forces to be carried on shoulder of connector rather than threads.
- Easy to stab because thread design does not allow crossthreading.
- Interference thread holds together under vibration.
- Three seal points: metal to metal seal at each of two shoulders and one elastomer o-ring (Figure 5).
- Integral lift sub/protector on box end can be used with Horseshoe and Side Door Elevators. No padeyes and slings required (Figure 8).
- Less expensive than most comparable connectors.
- Running speed faster than comparable connector.
- Connectors are made of readily weldable materials.
- DDS connectors are currently available in sizes 16" through 42" with more sizes being added. Specialty sizes are available upon request.
- The connector can be cut on the pipe or on an 18" long segment of pipe and then welded to the pipe body.
- In order to achieve higher connector strength, Frank's can provide X-70 grade pin and box material. This gives the customer the option of using API 5L-Grade B pipe coupled with high strength connectors.

DDS Solves Major Customer Concerns

No Premature Back-Out

Frank's DDS Connector will not prematurely back-out during driving or throughout the well's service life. This is achieved through the use of tapered press fit forces and with interlocking thread designs that help to overcome back-out forces. By making the pin thread tapered cone slightly larger than the mating box thread cone, a press fit condition is created between the box and pin, creating radial and axial preload during make-up. This creates an extremely tight fit, thus preventing premature back-out.

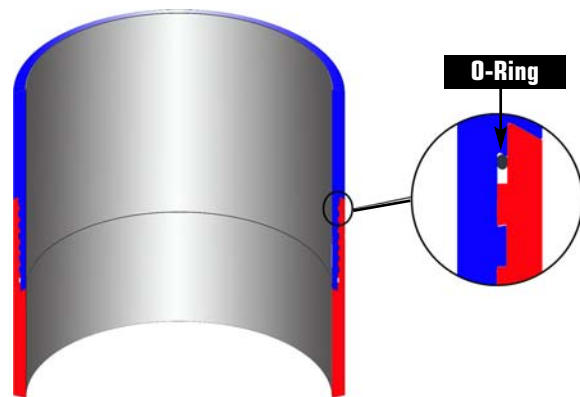
Four design features combine to create a back-out resistant connection system.

1. Mating press fit cones of micro-tapered pin and box threads store radial preload forces in the expanded box and compressed pin to strongly resist back-out
2. Interlocking Threads with 15 degree negative angle "hooked" load flanks pull box and pin surfaces together to secure the press fit interface between the pin and box surfaces.
3. Low thread helix angle from 1/2 degree to 3/4 degree is well below the surface's friction angle of 7 degrees or more and ensures the thread itself resists backing out.
4. 30 degree negative angle interlocking double torque shoulders prevent separation of the press fit surfaces and provide a positive connection stop.

Interlocking double shoulders provide a positive stop for the connection and prevent shoulder expansion during driving. Single start thread with low helix angle and press fit conical surfaces eliminate the need for anti-rotation devices.

DDS Will Not Bend While Driving or During Service

When using high strength pin and box material, the connection bending strength is greater than the conductor pipe's bending strength. Interlocking threads and shoulders combine with support from the thread crest to thread root contact to resist bending as if it were a solid structure.



Connection is Drivable

The DDS supports drive forces on both shoulders of the connector and in line with the thread. Due to a combination of strong connector material and balanced wall areas of the box and pin, the compressive strength of the connection exceeds the compressive strength of the pipe. Interference fit thread contact is extremely vibration resistant.

DDS Will Not Leak During Service

Leak proof integrity is maintained by double torque shoulders and resilient o-ring.

Make-up torque preloads both metal interlocking shoulders together forming two metal to metal seals. The elastomer o-ring on the pin relief groove at the box counter bore further ensures that fluid leakage is prevented.

DDS Is Cost Effectiveness

The DDS is an economical alternative to complicated and expensive competing systems. When machining the pin and box directly onto the pipe body, the cost of connector raw material, welding the connector to the pipe and any weld NDE are completely eliminated.

DDS Will Not Waste Time

No time wasted during make-up, running and hammering. DDS features easily stabbed connections that cannot crossthread. Rugged, course pitch thread with blunt start "Higbee" combine for trouble free make-up.

For more information call 1 -800-833-7265 or e-mail info@frankscasing.com
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