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Title: FIELD INSPECTION OF BENOIT[®] BTS[®] CONNECTIONS				

Field Inspection of BTS[®] Connections

Benoit's "BTS[®]" premium tubing connections have been used by most major and independent oil companies for over 30 years in nearly every well condition imaginable. The great success of the BTS[®] thread is largely due to its rugged design, which in many cases allows the same tubing to be used for workover or drilling operations and then run as the production string.

Slight damages to BTS[®] connections caused by handling or operational use may be acceptable depending on the severity. In order to perform visual inspection of BTS[®] connections it is essential to possess a thorough understanding of the basic design features.

The **threads** of BTS[®] connections are straight, non-tapered, and non-interference. There are two sets of threads cut on separate diameters. The threads of BTS[®] connections *do not* act as a pressure seal. The purpose of the threads is to hold the pin and box together with adequate contact of the shoulders and seals and to distribute the tensile load of the string between the pin and box connections.

The **14° metal-to-metal** seal between the pin and box is the primary internal pressure seal. This seal provides positive seal capability even after repetitive makes and breaks. To operate, there must be adequate engagement of the seal around the full circumference of pin and box connections.


The **30° shoulder** of BTS[®] connections is the primary torque stop and controls the position of the pin relative to the box. It also provides a large metal-to-metal external pressure seal.

The **90° intermediate shoulder**, positioned between the two thread steps on BTS[®] connections, is machined with very close linear tolerances so as not to interfere with the make-up of the connections. Its main purpose is to protect against over-torquing.

The **pin and box I.D. bores** are machined concentric to the thread diameters. This provides a smooth, recess-free bore to prevent turbulence of the drilling and production fluids, which could cause erosion, and nearly eliminates the chance for "hang-ups" and damage to internal tools required for completion.

The **pin and box O.D. and transition areas** provide a smooth, streamlined external profile to prevent the tubing string from sticking and hanging up in the well bore especially in deviated runs.

The optional "**PR**" (**Protective Ring**) **groove** is precisely machined at the rear of the 14° seal of the box connection and provides for the installation of a Teflon (PTFE) "protective" ring. During make-up the ring is compressed and locked into the groove. The PR feature completes the coating on internally-coated tubing and effectively protects the internal metal-to-metal connection seals against corrosive fluids and gases on coated or uncoated tubing.

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Prior to performing visual inspection or field repair, the threads and seals must be thoroughly cleaned. The preferred method of cleaning is the use of a steam cleaner or hot-water pressure washer with no soap or solvent. Do not use wire brushes.

Visually inspect the entire diameter of the connection for the following conditions:

(1) **Threads**

- Galling – *Not acceptable – except for very minor tearing that can be effectively cleaned up.
- Out-of-roundness – Not acceptable
- Mashers or dents on the threads – Not acceptable
- Excessive rust or pitting – Not acceptable

*Minor damages in the thread area such as dings, nicks, and light scratches may be acceptable, provided they do not form bulges, protrusions, galling, slivers, or surface irregularities which could affect connection make-up. Repair of some minor damages using a small 3-corner file, die grinder equipped with a fine-grit rubberized abrasive wheel, and/or 120-grit or finer emery cloth, is acceptable provided the finished product is free of the offending defect and the thread form is not otherwise changed.

(2) **Seals - 14° Internal Pressure Seal / 30° Torque & External Seal Shoulder**

- Excessive pits, rust, or scale
- Galling
- Cuts and scratches
- Dents and/or mashers
- Flared shoulder on pin and crimped or ballooned boxes (both caused by over torquing)

Damage to seal areas is not acceptable and generally not field repairable. BTS[®] connections with damaged seals should be returned to Benoit[®], or to a licensed facility, for repair.


(3) **Intermediate Shoulder (Middle 90° Shoulder)**

- **Dents and/or mashers - Minor defects may be field repaired as described in (1) above.
- **Galling, Rolling or flaring caused by over-torquing

**These conditions generally suggest more severe damage that may not be visually detected and normally are not field repairable.

(4) **Pin/Box I.D. Bore**

- Excessive scale or rust – Remove & evaluate for pitting. If pitting exceeds .005”, refer to Benoit[®] “BTS[®] Upset Defect Allowances.”
- Mashers which would prevent drifting – Evaluate for drifting – “No-Drift” not field repairable.
- Washout areas – Not repairable

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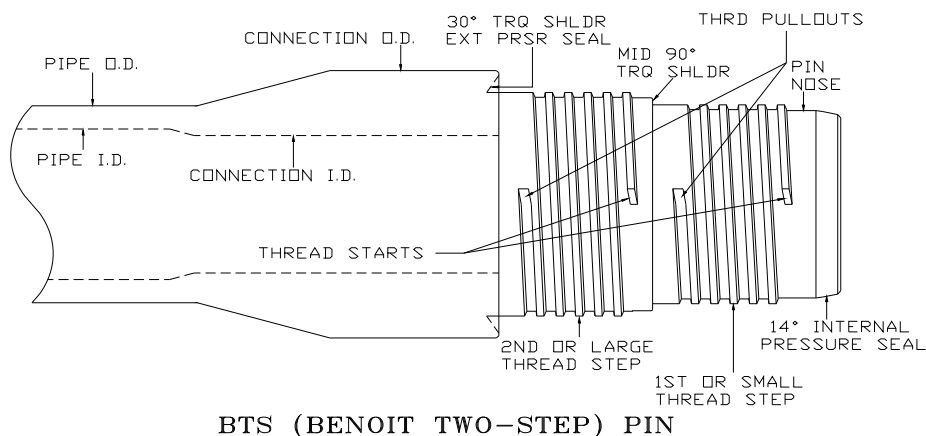
(5) **Pin/Box O.D. and Transition Area**

- Excessive tong marks and slip-grooves – API defect acceptance criteria.
- Dents and mashes – API defect acceptance criteria. - Dents / mashes which result in ovality are not acceptable.

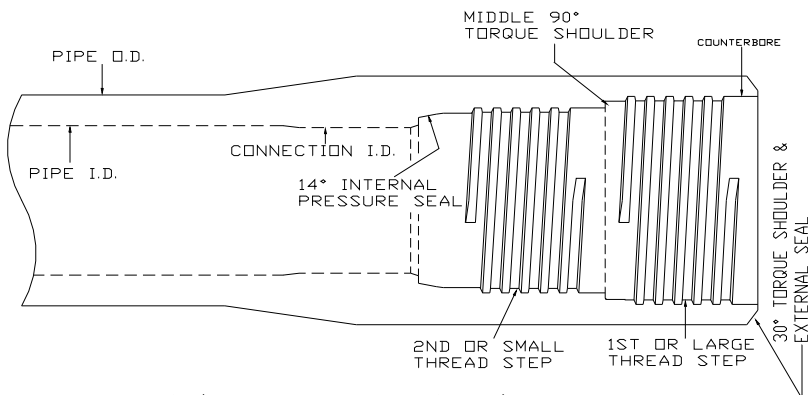
(6) **PR Groove**

- Rust or scale buildup in groove – Remove – evaluate for pitting, not to exceed .005.”
- Excessive plastic coating in groove – Not field repairable

BENOIT® “BTS®” CONNECTION NOMECLATURE



BTS (BENOIT TWO-STEP) PIN



BTS (BENOIT TWO-STEP) BOX