SUBJECT: PREMIUM CONNECTION COUPLING MAKE-UP PROCEDURE

1.0 SCOPE

1.1. This document sets for the procedure for the mill end make-up of bucking of Premium Threaded and Coupled casing connectors.

1.2. This document applies to the following Hunting Premium Connections: SL-APEX, SL-XD, SL-XP PC, SL-XP TC and SL-HC/GS.

2.0 DEFINITION

2.1. Make-up shall be defined as the power tight application of a coupling or box connector to a pin connector.

3.0 EQUIPMENT

3.1. The following list of equipment is required in the making-up or the bucking-on of couplings to pin connectors.

3.1.1. Appropriate size, grade, type of box Connector, or coupling to match the pipe and pin connector.

3.1.2. An adequate supply of clean, uncontaminated thread compound.

NOTE 1: Hunting recommends running these products with molybdenum disulfide along with approved thread compound. SEE WEBSITE: Hunting-intl.com / Approved Thread Compounds

WARNING: Hunting DOES NOT recommend any thread lubricant with large particles such as Best-O-Life 2000 on its metal-to-metal sealing connections. It has been proven to compromise connection integrity on Hunting's metal-to-metal sealing connections.

3.1.3. Thread lubricant application brushes (Model 58235 moustache brush recommended).

3.1.4. Molybdenum disulfide spray. Hunting recommends Banner Moly-G-Spray, Jet Lube Moly Mist or DuPont Molykote D-321 R.

3.1.5. Power tongs capable of producing the required torque range.

3.1.6. Appropriate connection datasheet.

3.1.7. 0.005" Feeler Gage.

3.1.8. RECOMMENDED - Torque turn monitoring system.

3.1.9. Hunting Field Service Kit comprised of caliper and pit gauge (Four (4) month Calibration Frequency).

4.0 Certification

4.1. The torque unit load cell shall be calibrated for accuracy every six (6) months.

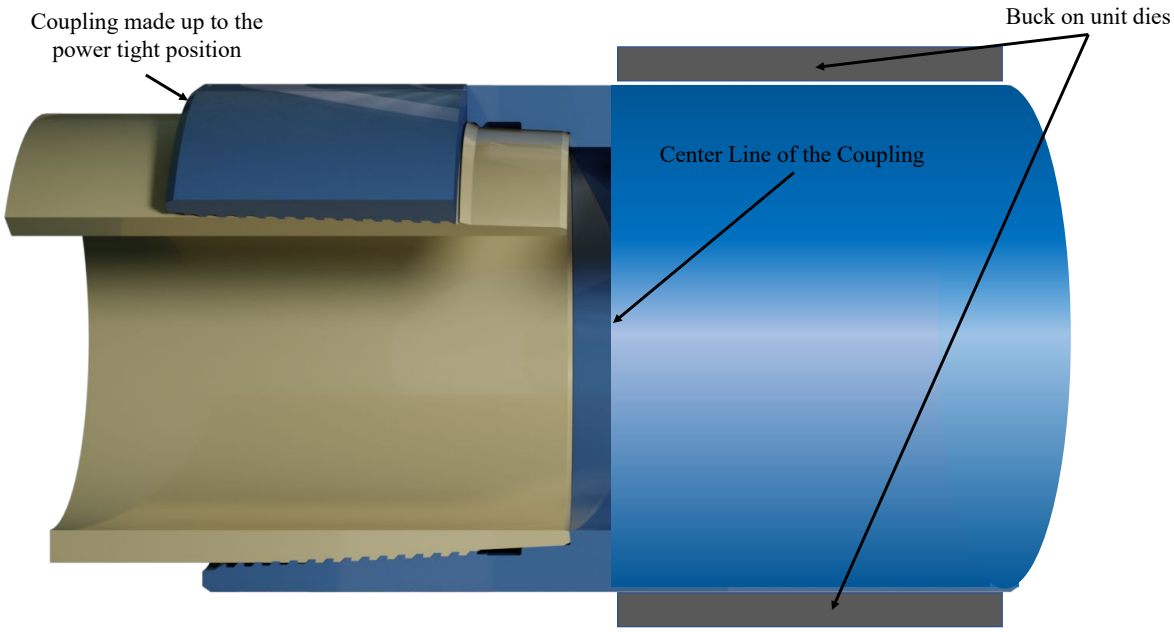
5.0 Dump Test

5.1. Dump test shall be conducted prior to casing run. Failure to verify dump test could result in premature dump of torque prior to acceptable optimal torque and or over torque of connection.

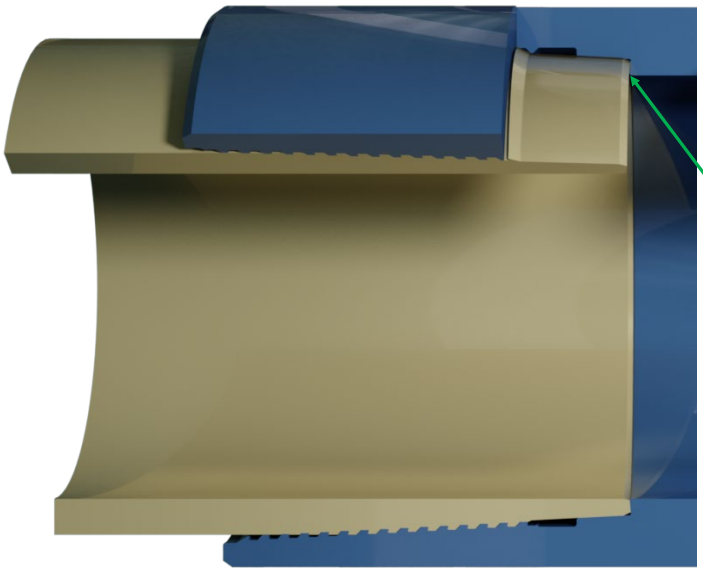
5.2. When conducting a dump test, the torque applied at test will depend on the wall thickness of the casing body. Consideration should be given to “THIN WALL” casing. This will have to be evaluated by the qualified Hunting representative on location at that time. It is recommended, in questionable thin wall casing dump tests, that 65% of the connection optimal torque be utilized. If the dump test results are questionable, contact HUNTING FIELD SERVICE for guidance.

5.3. When conducting multiple dump tests on casing, it is crucial that the Hunting representative have the tong operator release the jaws and remove the tongs from casing. Tongs are to be applied at a different area on the casing for sequential dump tests. Failure to do so may result in excessive die penetration or point loading which can jeopardize the integrity of the casing.

SUBJECT: PREMIUM CONNECTION COUPLING MAKE-UP PROCEDURE



BUCK ON UNIT DIE POSITION



MAKE UP INSPECTION

NOTE 2. The pitch diameter of field end coupling shall be verified after mill-end make-up.

NOTE 3. Mill-end make-up torque shall be limited to optimum torque.

SUBJECT: PREMIUM CONNECTION COUPLING MAKE-UP PROCEDURE

6.0 MAKE-UP PROCEDURE

6.1. Thoroughly clean and visually inspect both sides of the connection to be made-up.

6.1.1. Ensure that the pin thread start, and full form threads are free from tears and burrs.

6.1.2. Ensure that the coupling or box connector is free from burrs or tears on the starting threads and throughout the full form thread length.

6.1.3. Both connectors shall be free of any debris such as chips, shavings, dirt, or other foreign particles that could create galling or damage to the connection during make-up.

6.2. Cover both pin and coupling connectors that are to be mated during mill make-up with a thin, even coating of molybdenum disulfide spray.

6.3. Apply a light even coat of molybdenum disulfide to the entire threads, seals and torque shoulders of the coupling/box and pin connectors.

6.4. Apply a light coating of recommended thread compound to the thread and seal areas on the pin connector.

6.5. Apply a very light coat of thread compound to the seal and shoulder area of the coupling/box connector only.

WARNING: Applying thread compound to the threaded area of the coupling could introduce very high dope pressure in the dope groove area, which could cause the pin nose to collapse.

NOTE 4: A light to moderate, even coating of thread compound is defined as all thread surfaces, root and crest, seal surfaces and pin face/torque shoulder covered with an even coating of thread compound; however, the thread form should remain clearly visible.

6.6. Make up the coupling to the pin end by hand to the hand-tight position.

6.7. Position the connection in the power tongs.

6.8. Make up in high gear is allowed from stabbing to hand-tight but should be continuous and not exceed 20 RPM. Make-up speed should not vary excessively and should be continuous with no gear changing after the snub line becomes tight. In no case should the make up speed exceed 20 RPM in high gear and 5 RPM in low gear.

6.9. Make-up Torque/Turn Monitoring

6.9.1. A torque-turn /time or torque/turn monitoring system should be utilized. Monitoring equipment should be capable of resolving torque to 1/100th of a turn increment as a minimum but equipment capable of resolving torque to 1/1000th of a turn should be utilized when available. An enhanced computer display should be part of the torque-turn monitoring equipment and utilized to monitor make-up. The monitoring equipment should be capable of dumping during the make-up by either the computer technician or when maximum parameters are reached. As the torque enters the acceptable window, the technician should be able to depress a function key to manually terminate the make-up. The system should be capable of automatic dumping as input parameters are met. The load cells used with the torque monitoring equipment should be calibrated every six (6) months, traceable to the appropriate national standard.

6.9.2. If torque/turn monitoring equipment is used, a make-up torque/turn graph should be generated for every connection.

6.9.3. In the event torque/turn or torque turn/time equipment is used at the rig site, the following procedure should be used to set acceptance criteria:

a) Prior to the job, the operating company representative should review the Hunting sales data sheet for this connection. Shoulder torque acceptance limits should be in the range shown on Hunting's optimum torque/turn graph.

b) Those connections falling outside the acceptable shoulder torque values should be broken out and checked for damage. If no damage is found, the connection may be made up again. Adjust doping procedures as suggested in Section 5.4 NOTE to achieve higher or lower shouldering torque as necessary.

c) A torque curve showing a small wave shall be acceptable; however, the connection with a wave in the torque curve exceeding the shouldering torque shall be broken out and visually inspected. If no damage is found, the connection may be made up again.

d) Final torque in excess of the maximum acceptable final torque or less than the minimum acceptable final torque should be broken out and visually inspected. If no damage is found, the connection may be made up again.

NOTE 5: If an appreciable amount of thread lubricant is being pushed to the tube ID and/or the tube OD during make-up, too much thread lubricant is being applied to the connection.

7.0 MAKE-UP ACCEPTANCE AND REJECTION

7.1. For an acceptable make-up, torque requirements must be met.

7.1.1. The torque applied to the connection must meet the minimum published torque. The maximum torque may be exceeded on thick wall accessories.

NOTE 6. For SL-XD, SL-APEX and SL-APEX-E, the connection for sizes 3-1/2" and smaller should achieve a clear and distinct shoulder during make up. If necessary to achieve this criterion, 80% of the published minimum yield torque values stated on the CDS may be utilized.

NOTE 7. For SL-XD and SL-APEX and SL-APEX -E, the connection should achieve a shoulder torque with approximately 1000 ft-lb of shoulder delta torque prior to reaching 80% of the published minimum yield torque values stated on the CDS. This criterion is applicable for OD sizes greater than 3-1/2".

7.2. Thoroughly clean the thread lubricant from the connection ID. Ensure that the connection has shouldered by using the torque turn unit or by measuring the make-up by inserting the 0.005" feeler gage between the pin face and the torque shoulder. If the feeler gage enters the gap, the connection is not properly made up.

7.3. Visually and physically inspect the pin ID at the coupling torque shoulder to ensure that no deformation to the pin ID or torque shoulder has occurred. Reject damaged connections.

7.3.1. Following buck-up, the ovality or out-of-roundness shall be within the specified manufacturing tolerances for the product when measured on the open end of the coupling.

7.4. End drift the made-up connection in accordance with Hunting Connection Technology **Full Length Drift/End Drift Inspection Procedure (Generic)**.

8.0 REWORK

8.1. If the connection does not shoulder or make-up to the proper position, remove the coupling, clean, and visually examine both pin and coupling for damage. If no damage is found, remake

connection as directed in Section 5.0 and inspect as directed in Section 6.0 of this document. The amount of the thread lubricant may be altered, and a higher make-up torque (up to maximum recommended torque) may be used.

8.2. Connections which will not meet the criteria of Section 6.0 should be set aside and a Hunting representative contacted.

8.3. On metal-to-metal seal connections, apply recommended thread compound to the seal area on both elements (pin and box connectors).

8.4. Just prior to make up, the thread locking lubricant shall only be applied on the pin threads (not on the box), on the area that has not been covered by the approved thread compound.

8.5. When making up accessories like float equipment, hangers, thick wall accessories, and others, shoulder torques might be higher than normal due to relationship of the friction factors of the thread locking lubricant in comparison with the API Modified thread compounds and the wall thickness.

8.6. The make-up torque of the accessories should be aimed to the maximum recommended torque. Therefore, if necessary, the published torque may be exceeded but, in any case, shall not exceed 80% of the published minimum yield torque.