EVRlock QB2 Running Procedures

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1.0 TRANSPORTATION AND HANDLING

- Prior to unloading, a visual inspection of the load should be performed to ensure that all pin end thread protectors are in place.
- If pipe are found with missing protectors, they should be identified for additional inspections.
- Thread protectors must be secured in place when transporting pipe to and from location, during loading and unloading, and whenever pipe is moved.
- Load or unload with slings or fork lift.

Do not unload pipe with end hooks.

2.0 THREAD AND SEAL INSPECTION AND PREPARATION

- Ensure that the drive nubbins, float equipment, thread compound, thread lock, stabbing guides, drifts, snakes and any other required accessories are on location. Visually inspect to ensure that all accessories are in good condition.
- Adequate space must be given on the pipe racks for cleaning and visual inspection.
- Remove both thread protectors from each joint on the pipe racks and full length drift each joint prior to running in the hole. Use an appropriate sized Teflon or nylon drift and snake. All no-drifts should be clearly identified on the pipe and set aside.
- Field threads and sealing surfaces (box & pin) must be cleaned and the torque shoulder, metal-to-metal seal area, and threads visually inspected for damage. Please note: prior to delivery, the box and pin are coated with an orange corrosion inhibitor for storage.

  This orange corrosion inhibitor is NOT a thread compound. It must be removed prior to running because it is not compatible with the QB2-50M thread compound.

- Proper cleaning can be achieved using a solvent approved for your location and a non-metallic brush. The thread and seal areas should be wiped dry or blown out with compressed air, removing all solvent residues from these areas.
- Pin end thread protectors must be **thoroughly** cleaned to remove orange corrosion inhibitor and replaced prior to moving the pipe.
- Care should be taken to minimize the amount of time between cleaning and installation. If running is delayed, application of corrosion protection on the threads should be considered.

3.0 EQUIPMENT

Top Drive Rigs

- When not using bales and elevators, EVRAZ recommends the use of a casing running tool as opposed to a drive nubbin. Use of a casing running tool removes handling of the box thread and will reduce the opportunity for damage to the connection.
- If a drive nubbin is used, it should be inspected before use to ensure it is in good condition.
- Drive nubbins must not abrade or damage thread forms or phosphate coating.
- If not using with a integrated/conventional powertong, use of a calibrated, wireless torque stub is recommended for torque monitoring.

Slant Rigs

- Running casing on slant rig tends to exhibit a number of challenges not typically encountered on verticals:
  - Connection misalignment during stabbing
  - Connection misalignment during initial and intermediate make-up
  - Pipe support during initial make-up (working to minimize the side loading of the threads in the coupling)
- The pipe arm may be used as a support to align the pin and box

Power Tongs

- Power tongs should be clean with dies in good condition and have the correct size jaws for the casing being run.
- If a snub line is used, it should be connected and set at a 90 degree angle to the tong's arm.
- Tongs should be size-matched and be of sufficient power to apply the maximum torque for the given casing size and wall thickness.

Thread Compound

- QB2-50M Thread Compound is required for use with the EVRlock QB2 connection. The EVRlock QB2 was designed and qualified using this thread compound. Performance cannot be guaranteed with use of any other thread compound.
- The thread compound container must remain free of all contaminants (i.e.: water, ice, sand, solvent, sawdust, etc.) and should be thoroughly stirred prior to application to ensure proper mixing of solid particles.

- During cold weather, the thread compound should be stored inside and applied warm, if possible. In addition, steaming of the pipe ends is recommended to facilitate application of QB2-50M.
- Apply a thin, even coat of the thread compound to the pin seal and the pin and coupling threads. Thread compound on the coupling seal shall average two or more times the thickness of the compound on other surfaces, while thread compound remaining in the coupling's dope relief groove shall be minimized. A moustache brush is recommended. A thin even coat is defined as approximately 0.030" to 0.040" (0.75mm to 1mm) with thread form still clearly visible.

Do not over-coat.

Float Equipment

- The pin seal is to be covered with black electricians tape. The pin threads will be covered with a uniform coating of thread lock product. The seal tape will then be removed and a uniform coating of thread compound will be applied to the seal surface. The connection will then be made-up as outlined below.

4.0 RUNNING PROCEDURE

EVRAZ strongly recommends the use of bales and elevators paired with conventional or integral power tongs to run EVRlock QB2. In addition, EVRAZ recommends avoiding the use of a drive nubbin since they have been shown to cause damage to the coupling.

Remove pin end protectors at the last possible moment to prevent thread damage and never remove pin protectors prior to moving pipe ot the rig floor

Prior to making up the first connection, true vertical alignment of the rig must be checked. Misalignment in excess of 1/4 of a pipe diameter must be corrected prior to engagement and make-up.

For Tong Operation

- The tongs must not exceed 20 RPM while running in, and the speed must be reduced to 4 to 5 RPM when approaching the torque shoulder.

DO NOT shift to low gear within one thread turn of shoulder position.

- EVRAZ recommends use of a stabbing guide. Stabbing must be done carefully to avoid pin nose or seal damage. It is also very important that true vertical alignment be maintained during make-up.
- To avoid contamination inside of the coupling, the stump should be covered while the tower pipe is being moved into position.
- Pipe should be vertical and spin freely during make-up. Elevators should not interfere with this process.
- In the case of a miss stab where there is pin face and box contact, lift the joint and inspect the pin face.

Torque Monitoring

- Because the EVRlock QB2 connection has delta torque requirements on make-up, **Computer Torque Monitoring** is recommended. Please refer to the "EVRlock QB2 Torque Limits and Torque Monitoring Guidelines", (Appendix A), for make-up torque values and other make up tolerances.
- On a typical QB2 make-up chart, (Appendix B), the torque builds initially with thread interference and then as the seal engages. This is followed by a sharp increase in torque as the connection shoulders. If a proper shoulder has been achieved, the sharp rise in torque will take place with virtually no rotation. The shoulder torque **must** be checked to determine if the connection has shouldered within the allowable torque limits.

For example: the shoulder torque for 5 ½" x 17# EVRlock QB2 must be greater than 1,000 ft-lbs but less than 3,375 ft-lbs (75% of the optimum make-up torque of 4,500 ft-lbs).

- If the make-up chart displays a rounded curve that displays no shoulder identification (Figure A, Appendix B), it is then recommended that the connection be laid down.
- If the connection shoulders above the maximum shoulder rating, then it is recommended that the connection be backed out entirely. Both the coupling and the pin end should be cleaned thoroughly, wiped dry, and inspected for damage. If no damage has occurred, re-make the connection as outlined above. If the threads or either of the pin or coupling seals have been damaged the joint or joints should be laid down. Should several joints exhibit high shoulder torques, high shoulder torque threshold and optimal final torque may be increased in 5% increments to a maximum of 10% above the value specified at EVRlock.com for the remainder of the job or until such time as a pattern of normal shoulder torques is achieved.
- Following each make-up, lower the joint down the hole at a modest speed before engaging the slips.
- Place the stabbing guide on the coupling and repeat the running process.

For Top Drive Operation with drive nubbin: after each make-up visually inspect nubbin threads for damage. After approximately 6 make-ups, wash the nubbin with solvent and wipe dry for a thorough inspection. Repair if required and return the nubbin to the cat walk.

5.0 POST JOB

- All unserviceable and laid down joints must be painted red on the end which was damaged and clearly identified on the pipe body as to the reason for rejection.

- All unused connections following the job, including all accessories, must have storage compound applied and thread protectors firmly installed. This includes damaged connections. Damage may be minimal and thus repairable.

Thread Protectors

- EVRlock QB2 thread protectors are recyclable. All thread protectors are to be collected and returned for recycling. To coordinate pick up from your rig location please contact your local approved protector recycler to arrange for provision of protector transportation bags and collection of the protectors.

Appendix A – Torque Limits and Torque Monitoring Guidelines

- To help ensure a proper make-up, it is recommended that computer torque monitoring and certified thread supervision be used.
- The following torque recommendations are applicable to grades J-55, K-55, L-80, P110.
- Figure A.1 graphically illustrates a typical torque-turn plot.
- Table 1 summarizes shouldering and recommended minimum delta torque
    - See section 4.0, troubleshooting for guidance on adjusting torque to field conditions

Table 1 QB2 Shouldering Torque and Recommended I

Geometry		Torque		
Size	T & C	Shoulder		Delta
		Minimum	Maximum	Minimum
(Inches)	(Inches)	(ft.lbs)	(ft.lbs)	(ft.lbs)
4 1/2	11.6	750	1,900	750
5 1/2	15.0	1,000	3,000	1,000
	17.0	1,000	3,400	1,000
7	23.0	1,000	5,600	2,000
	26.0	1,000	6,800	2,000
8 5/8	28.0	1,000	7,100	2,000
	32.0	1,000	8,600	2,000
9 5/8	36.0	2,000	11,250	2,000
	40.0	2,000	12,500	2,000

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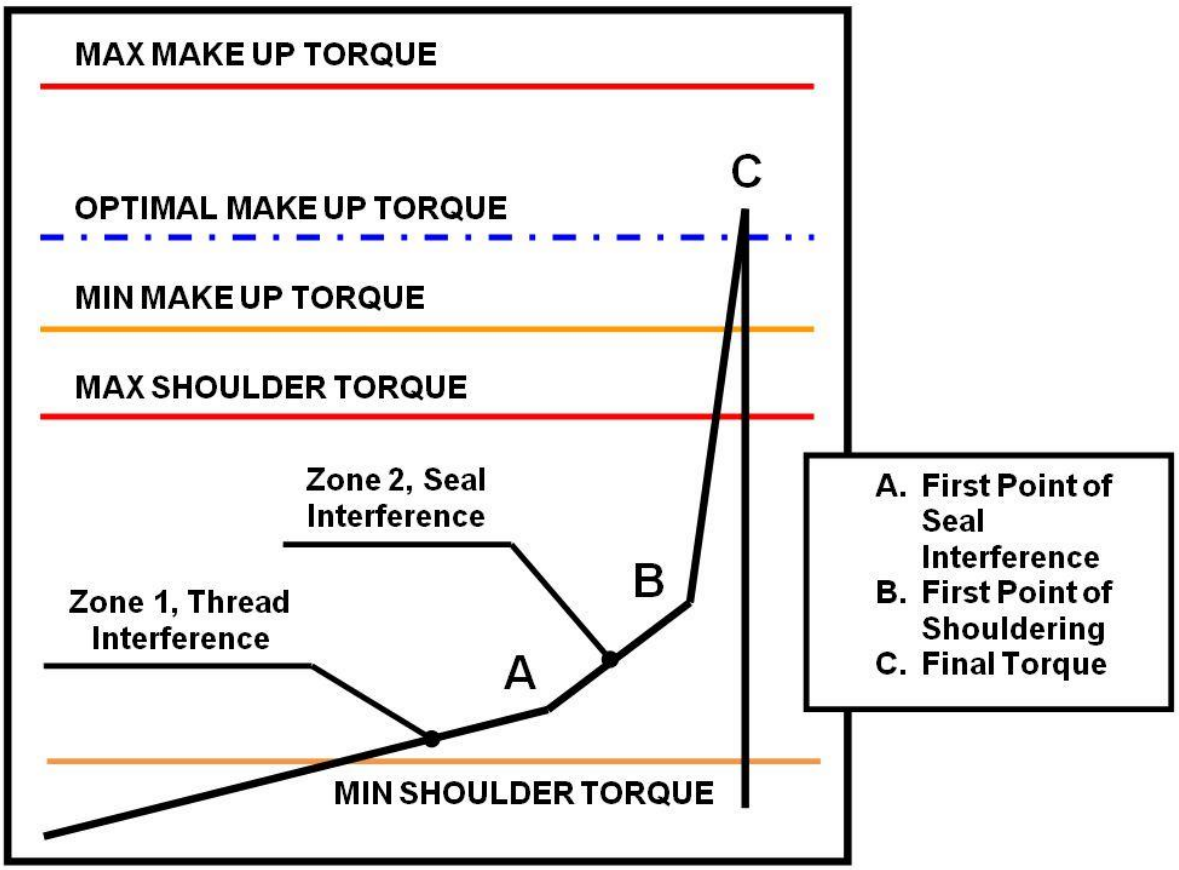


Figure A.1 – Typical Torque-Turn Plot

Appendix B – Common Make-up Issues

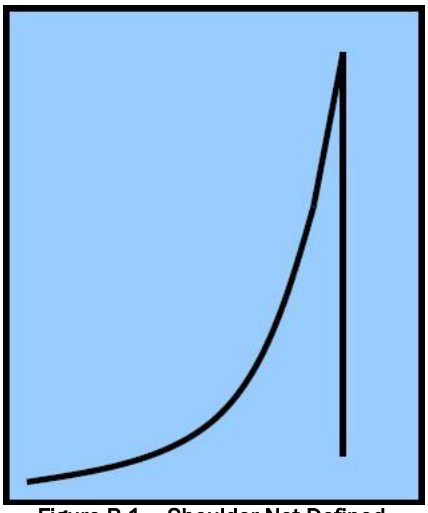


Figure B.1 – Shoulder Not Defined
Possible Causes: Misalignment, contaminated threads

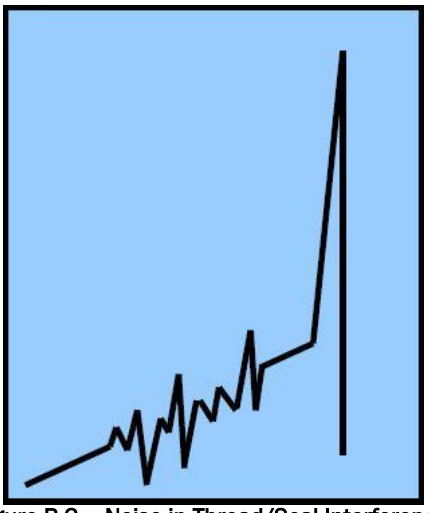


Figure B.2 – Noise in Thread/Seal Interference
Possible Causes: Galling or damage to thread or seal during make-up, cross threading

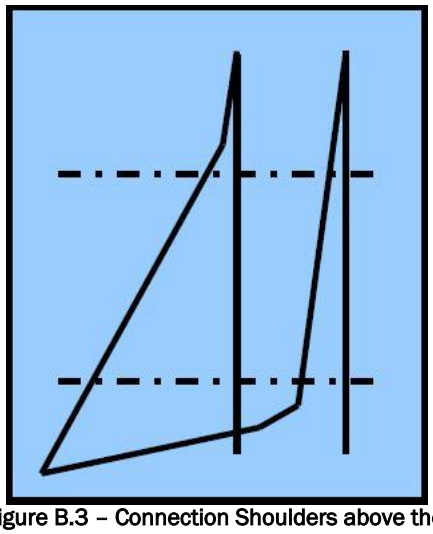


Figure B.3 – Connection Shoulders above the maximum allowed torque or under the minimum allowed torque
Possible Causes: misalignment, poor calibration

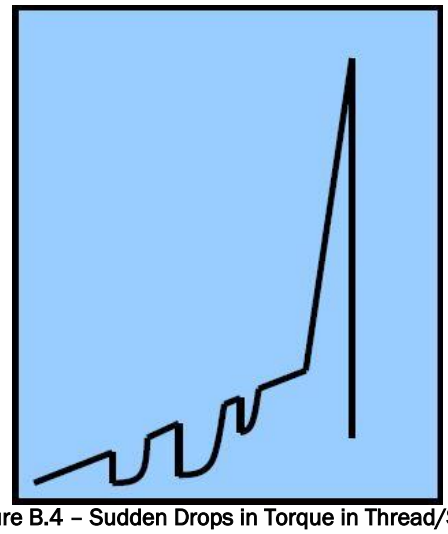


Figure B.4 – Sudden Drops in Torque in Thread/Seal Interference
Possible Causes: Tong and/or backup dies are slipping.

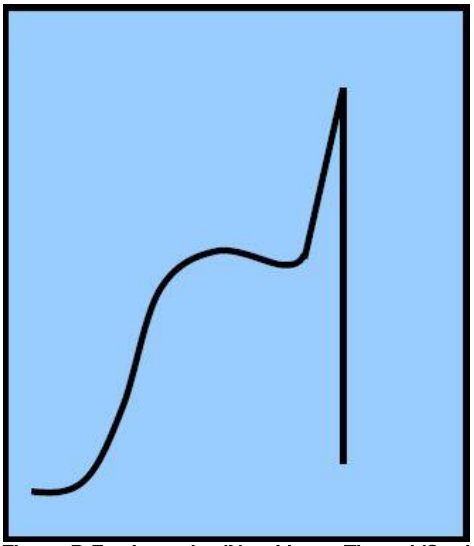


Figure B.5 – Irregular/Non-Linear Thread/Seal Interference

Possible Causes: Over application of thread dope, contamination of thread dope

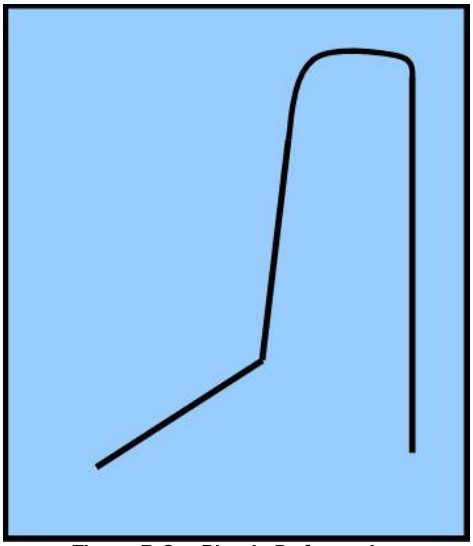
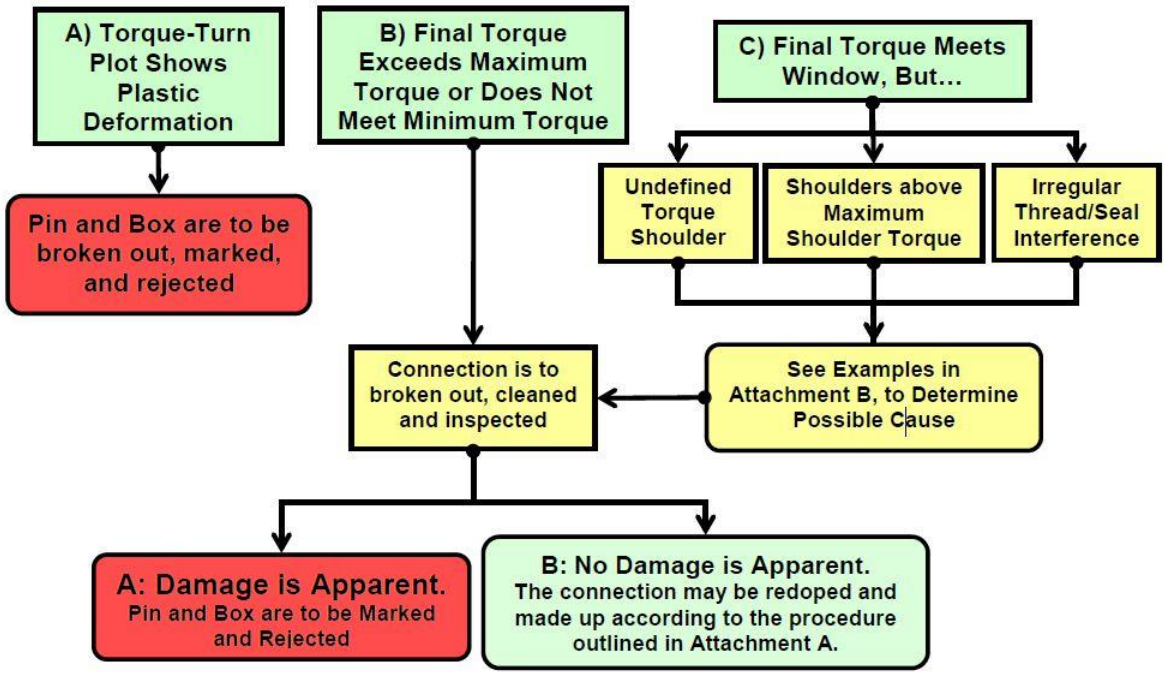


Figure B.6 – Plastic Deformation

Possible Causes: Exceeding maximum make-up torque, bad calibration of power tongs

Appendix C – EVRlock QB2 Troubleshooting Flow Chart



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Revision History

Revision	Date	Details
0	September 2011	First issue
1	October 31, 2013	Updated to include current best practices
2	June 12, 2014	Formatting and editorial changes only
3	October 21, 2016	Removed Table 1; users are referred to EVRlock.com for values originally listed in Table 1.
4	May 2, 2017	Added Table 1