DOC. NO: PC-REP-004
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EVRlock EB Running Procedure

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1.0 TRANSPORTATION AND HANDLING

- Prior to unloading casing, a visual inspection of the load should be performed to ensure that all thread protectors are in place.
- If pipe are found with missing protectors, they should be identified for additional inspections.
- Thread protectors must be securely in place when transporting pipe to and from location, during loading and unloading, and whenever pipe is moved.
- Load or unload with slings or forklift. **Do not unload pipe with end hooks.**

2.0 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, if required.
- 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 appropriately sized Teflon or nylon drift and snake. All no-drifts should be clearly identified on the pipe and set aside.
- A visual verification of the mill end make-up position should be performed on several mill ends to verify the coupling has not rotated during handling and transportation. To help in determining this, the end of pin to coupling face distance on the mill end should be equivalent to the makeup loss (table 1) +0.15”/-0.1”. This should be measured with a t-bar caliper to ensure that you are measuring parallel to the pipe axis and not with a ruler.
- Pin end thread protectors must be replaced prior to moving pipe and should be free from contamination.

3.0 EQUIPMENT

Top Drive Rigs

- When <u>not</u> 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 eliminates the possibility for damage to the coupling threads due to excessive interference.
- If a drive nubbin is used, it should be inspected before use to ensure it is in good condition. Additional inspections should be performed after every six make-up/break out cycles.

- Drive nubbins must not abrade or damage thread forms or phosphate coating.

Power Tongs

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

Thread Compound

- EVRlock EB is shipped with Topco Greenseal Supreme (Canada) or Best-o-Life (USA). Other thread compounds may be used upon consultation with EVRAZ Technical Services.
    - If other API 5A3 compliant thread compounds are utilized the torque correction factor noted by the compound manufacturer must be considered
- 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 thread compound.
- Apply a thin, even coat of the thread compound to the pin and coupling threads.
    - A 4" wide (100) paint brush is suitable for applying thread compound on the pin threads.
    - A bottle brush or a dope brush is recommended for applying thread compound to the coupling threads.
- A thin even coat is defined as being approximately 0.030" to 0.040" thick (0.75 to 1) with the buttress form still clearly visible. If an excessive amount of compound has been squeezed out at the power tight position reduce the amount compound being applied to the threads.
- The guidelines noted above are provided as a recommendation only. Other thread compound application practices that exhibit good workmanship and that produce expected levels of connection make-up and break-out performance may be adopted.

4.0 RUNNING PROCEDURE

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

- Prior to making up the first connection, true vertical alignment of the rig must be checked. Misalignment over the stump in excess of one half pipe diameter must be corrected prior to engagement and make-up.
- The EVRlock EB connection has a triangle stamped on the field end pin (the triangle is aligned with a white "tattletale" stripe on the tube surface).

For Tong Operation

- The tongs should not exceed 25* RPM while running in, and the speed should be reduced to 8 to 12 RPM* for the last turn.
  * Minor Excursions (+15%) beyond these RPM values can be tolerated on an intermittent basis, however; should more than 25% of the connections that have been made-up exhibit excursions be noted, the cause of variance should be determined.

Do not shift to low gear within one thread turn of shoulder position.

- EVRAZ recommends the use of a stabbing guide. Stabbing should be done carefully to avoid pin nose damage. It is also particularly important that reasonable vertical alignment be maintained during make-up to avoid galling.
- To avoid contamination inside of the coupling, the stump should be covered when the tower pipe is being moved into position. The cover must be removed just prior to stabbing.
- Pipe should be vertical and spin freely during make-up. Elevators should not interfere with this process.

Running Torque & Triangle Position

- During initial connection make-up on the first 10 joints, the location of the face of the coupling in relationship to the triangle must be visually verified. The nominal make-up position at power tight should position the face of the coupling at a location halfway between the triangle base and the apex when the connection has shouldered.
- Should coupling rotation be observed on the mill end during final power tight make-up verify the position of the coupling face relative to the mill end triangle.
- Please refer to EVRlock.com for recommended torque value ranges for the diameter, weight & grade being run (or refer to Section 6 of this document).
- Computer Torque monitoring is not required to run this connection. If Computer torque monitoring is utilized, please contact EVRAZ Technical Services should additional technical support be required.

Lowering the Pipe

- 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.

Rotating the String

- String rotation speed should not exceed make-up speed
- When increasing rotation torque past the maximum make-up torque, the maximum rotational speed should be lowered as per Figure 1
- Rotating at a torque greater than 80% of the maximum yield torque should be avoided. Sustained rotation at these levels can lead to premature casing failure.

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 EB 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.

6.0 TECHNICAL NOTES

- EVRlock EB is an “Enhanced Buttress” connection that utilizes a modified coupling to create a pin-on-pin buttress thread variant.
- Coupling design – Mill ends and field ends of the coupling are not interchangeable. Should a coupling need to be broken out in the field please note the orientation of the “M” end (denoted by black paint around the circumference of the coupling). This orientation must be maintained should the coupling be made power-tight on the mill end of a different joint.
- The buttress triangle stamp on the mill ends and the field ends pins are not located at the same axial position as detailed in API 5B. These witness marks should not be referenced when making up accessories.

Table 1 Dimensions

Diameter		Weight		Drift Diameter (Standard)		Coupling Diameter		Make-Up Loss	
USC	Metric	USC	Metric	USC	Metric	USC	Metric	USC	Metric
4 ½	114.3	11.6	17.3	3.875	98.4	5.250	133.4	4.34	110.2
4 ½	114.3	13.5	20.1	3.795	96.4	5.250	133.4	4.34	110.2
4 ½	114.3	15.1	22.5	3.701	94.0	5.250	133.4	4.34	110.2
5 ½	139.7	17.0	25.3	4.767	121.1	6.300	160	4.53	115.1
5 ½	139.7	20.0	29.8	4.653	118.2	6.300	160	4.53	115.1
5 ½	139.7	23.0	34.2	4.545	115.4	6.300	160	4.53	115.1
7	177.8	23	34.3	6.241	158.5	7.875	200	4.90	124.5
7	177.8	26	38.7	6.151	156.2	7.875	200	4.90	124.5
7	177.8	29	43.2	6.059	153.9	7.875	200	4.90	124.5
7	177.8	32	47.6	5.969	151.6	7.875	200	4.90	124.5
8 5/8	219.1	28	41.7	7.892	200.46	9.625	244.5	5.21	132.3

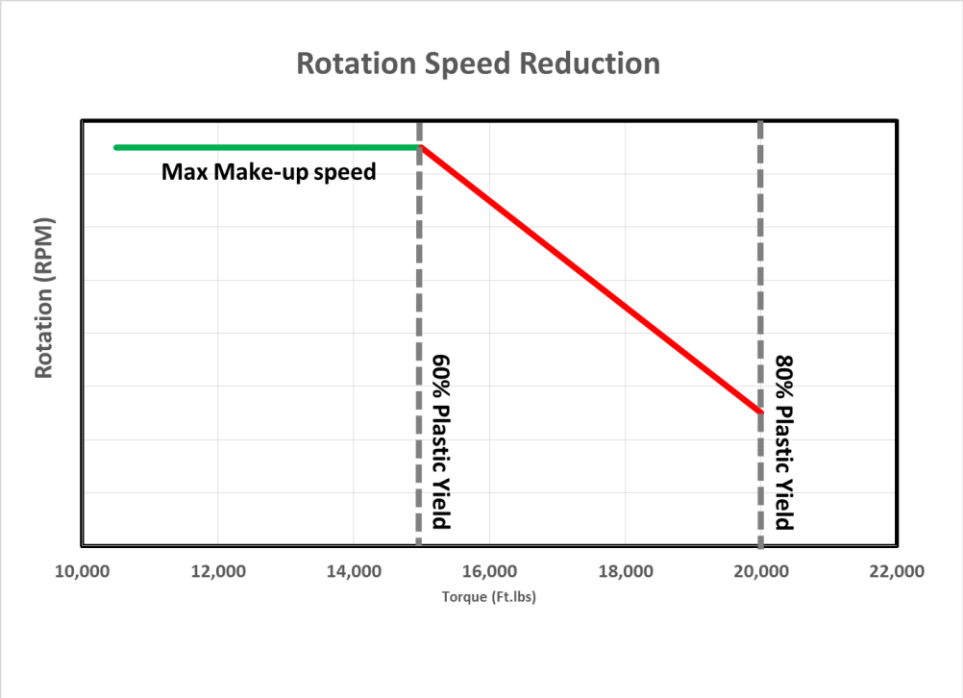

Figure 1, Rotation limit based on running torque

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Table 2a Make-up Torque (Imperial Units)

OD (in)	Weight (lb/ft)	Grade	Make-up Torque * (ft.lbs)				Plastic Torque * (ft.lbs)
			Optimal	Max	Min	Max Shoulder	
4.500	11.6	P110	6,250	7,500	5,250	6,250	8,500
4.500	13.5	P110	6,500	8,000	5,500	6,500	12,500
4.500	15.1	L80	8,600	10,000	7,000	7,500	14,800
4.500	15.1	P110	10,000	13,000	8,000	8,000	18,800
5.500	17.0	P110	10,000	13,000	8,000	10,000	20,000
5.500	20.0	P110	10,000	13,000	8,000	10,000	20,800
5.500	23.0	L80	12,000	14,250	9,850	9,850	20,800
5.500	23.0	P110	12,000	15,000	10,000	12,000	20,800
7.000	23	L80	12,000	14,750	10,200	12,000	21,250
7.000	23	P110	10,500	15,000	9,000	10,500	25,000
7.000	26	L80	13,000	20,000	11,350	13,000	30,000
7.000	26	P110	16,500	24,500	12,300	16,500	37,400
7.000	29	P110	19,500	28,500	13,650	19,500	43,600
7.000	32	P110	14,000	18,000	12,000	14,000	62,000
8.625	28	L80	22,000	32,500	17,000	17,000	47,300

7.000 in and greater, min delta: 1,000 ft.lb (average) 500 ft.lb (starting, no more than 2 consecutive) 4 1/2 in, min delta: 500 ft.lb (average) 250 ft.lb (starting, no more than 2 consecutive)

* These values verified using physical specimens and an API Modified equivalent thread compound. For similar performance, it is recommended to use API Modified or an equivalent thread compound.

Table 2b Make-up Torque (Metric Units)

OD (mm)	Weight (kg/m)	Grade	Make-up Torque * (Nm)				Plastic Torque * (Nm)
			Optimal	Max	Min	Max Shoulder	
114.30	17.3	P110	8,400	10,100	7,100	8,400	11,500
114.30	20.1	P110	8,800	10,800	7,400	8,800	16,900
114.30	22.5	L80	11,650	13,550	9,500	10,150	20,050
114.30	22.5	P110	13,500	17,500	10,750	13,500	25,450
139.70	25.3	P110	13,500	17,500	10,750	13,500	27,100
139.70	29.8	P110	13,500	17,500	10,750	13,500	28,200
139.70	34.2	L80	16,250	19,300	13,350	13,350	28,200
139.70	34.2	P110	16,250	20,250	13,500	16,250	28,200
177.80	34.3	L80	16,250	20,000	13,800	16,250	28,800
177.80	34.3	P110	14,250	20,300	12,200	14,250	33,900
177.80	34.3	L80	17,600	27,100	15,350	17,600	40,650
177.80	38.7	P110	22,300	33,200	16,600	22,300	50,700
177.80	43.2	P110	26,400	38,600	18,500	26,400	59,100
177.80	47.6	P110	19,000	24,400	15,250	19,000	84,050
219.08	41.67	L80	29,800	44,000	23,000	23,000	64,150

177.8mm and greater, min delta: 1,350 Nm (average) 675 Nm (starting, no more than 2 consecutive) 114.3mm, min delta: 675 Nm (average) 325 Nm (starting, no more than 2 consecutive)

* These values verified using physical specimens and an API Modified equivalent thread compound. For similar performance, it is recommended to use API Modified or an equivalent thread compound.

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Revision History

Revision	Date	Details
0	September 15, 2017	First issue
1	September 21, 2017	Released for field use
1.1	September 22, 2017	7 Torque data added
2	October 19, 2017	Additional data
3	April 17th, 2018	4 ½ OD data added
3.1	May 11, 2018	Correct metric weight/length
4.0	Nov 20, 2018	Addition of 5 ½ OD 20 and 23
4.1	Nov 21, 2018	Additional 5 ½ OD 20 data
4.2	December 13, 2018	Addition of 5 ½ OD 17 data
4.3	December 20, 2018	Addition of 5 ½ OD 23 L80 Note
4.4	July 29, 2019	Addition of 7 OD 32 data and graphical changes
4.5	October 25, 2019	Addition of 4 ½ OD 15.1 data and 4 ½ OD Coupling OD revision
4.6	October 2, 2020	Revision to section 2, stand-off verification
4.7	April 27, 2023	Addition of 7 OD 23 and 26 L80 data
4.8	May 24, 2023	Addition of 7 OD 26 and 29 P110 data
5.0	November 29, 2023	Addition of 4 ½" OD 15.1#, 5 ½" OD 23# and 8 5/8" OD 28# L80 data. Split Table 2 into 2a (imperial) and 2b (metric). Other formatting improvements.