Running Procedure for Bushmaster® SL Connection

Procedure No: FT-RP-015

Rev: 01

Approvals

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Revision Control

Rev	Description of Changes	Date Issued
00	Approved for release	11/17/2023
01	Revised to include additional criteria to specify guidelines to properly run BSL.	05/06/2025

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1. General Running Procedure

1.1 Refer to General Running Procedure No. FT-RP-000 latest revision.

1.2 Bushmaster® SL requires Slip Type Elevators to run.

1.3 Handling Plugs and Stabbing Guide are required for running.

1.4 Fermata® strongly recommends the use of a Fermata® certified and trained thread rep service company during all Fermata® Connections casing runs. If a Fermata® certified/trained thread rep service is not used, the operator is responsible for approving and ensuring that all connection make-ups meet Fermata® make-up criteria.

2. Thread Compound Application

2.1 Fermata® recommends the use of Fermata® Constrictor® Advanced Thread Sealant for all sizes on the pin of the connection.

Figure 1: Fermata® Constrictor® Advanced Thread Sealant

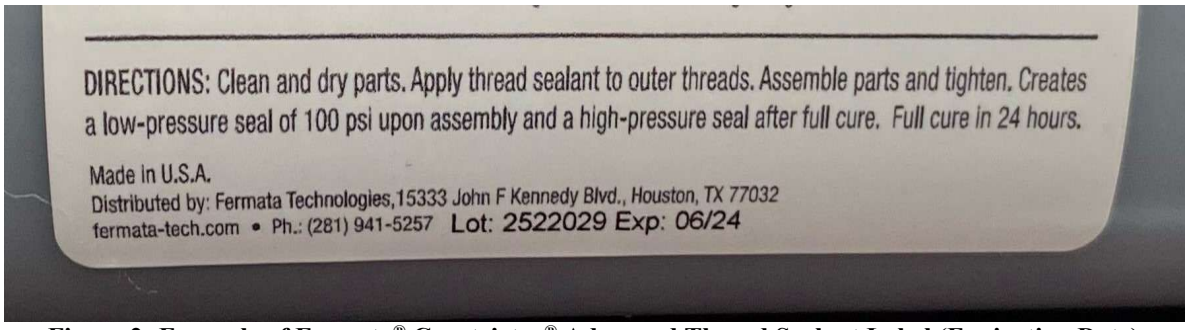

Figure 2: Example of Fermata® Constrictor® Advanced Thread Sealant Label (Expiration Date)

2.2 The amount of applied thread compound will depend on the size configuration of the connection.

2.3 The thread sealant will need to be measured to ensure the proper amount of sealant is applied to the connection, to lightly coat the root and crest of the pin connection. Refer to Table 1 for the required thread sealant mass in accordance with the size and weight configuration.

Table 1: Constrictor® Advanced Thread Sealant Amount

OD (inches)	Volume (mL)
3-1/2”	1.25
4-1/2”	3
5”	3.5
5-1/2”	5
7	5
7-5/8”	6.25
8-5/8”	6.25
9-5/8”	7.5

2.4 The use of a fine bristle mustache or 1” paint brush is recommended to best control the application of thread sealant. The brush should be clean and free of any water. Water that is on the brush or connection must be completely removed before the application of sealant.

2.5 Under certain circumstances, the thread sealant brand and application process may be altered, only if approved by Fermata® Engineering.

Figure 3: Example of Proper Thread Compound Application of the Pin Connection

2.6 Ensure not to overapply thread compound. When using a measuring spoon to measure the thread compound amount, level the spoon by scraping the top of the spoon with flat edge if the volume increment is equivalent to the spoon (example: if 5mL is specified in the running procedure and a 5mL spoon is used for measuring, level the spoon). Use the applicator brush to clean out the spoon and spread the compound evenly across all threads. Do not apply any compound past the base of the make-up indicator.

2.7 Excessive thread compound can cause dope squeeze and/or yielding on a connection. If dope squeeze or yielding is observed, reduce the amount of thread compound. It is recommended to start with a reduction of 30%. Ensure that the connection maintains light and full coverage. The following figures (Figures 4 & 5) are 2 unacceptable graphs due to excessive compound.

Figure 4: Yielding

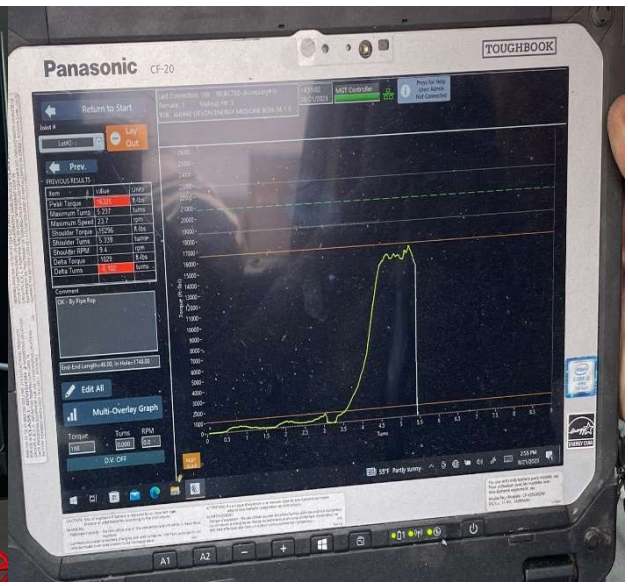

Figure 5: Dope Squeeze

3. Connection Compatibility

3.1 Bushmaster® SL pins have limited compatibility with differing weights with the same OD as listed in Table 2. Careful consideration of the performance properties of the weakest connection must be made by the operator when using the Bushmaster® SL weight configurations interchangeably per Table 2. Confirm specific weight compatibility with a Fermata® representative prior to running.

Table 2: Interchangeability Chart; Brackets Indicate Interchangeable Weights

OD (inches)	Weight (LB/FT)
4.500	11.60
4.500	12.60
4.500	13.50
4.500	15.10
5.000	18.00
5.000	21.40
5.000	23.20
5.000	24.10
5.500	17.00
5.500	20.00
5.500	23.00
5.500	26.00

4. Coupling Identification

4.1 Bushmaster® SL couplings shall follow Table 3 Color and Band Codes below.

Table 3: Bushmaster® SL Coupling Color Codes

Coupling Grade	Grade Type	Coupling Color	OD Color	No. of Bands	Band Colors	Connection Size & Weight
P110	-	White		1 – Black 1 – Orange		5.500” 17#
P110	-	White		1 – Black		5.500” 20 & 23#

Figure 6: Example 5.500" 17# Bushmaster® SL

Figure 7: Example 5.500" 20 & 23# Bushmaster® SL

5. Connection Make-up

5.1 The Field Service Technician must ensure that he has the correct and latest data sheets.

5.2 The Field Service Technician will apply all thread compound per Fermata® connections requirements prior to starting the casing run. If any joints are not able to have thread compound applied on the pipe rack due to the way the pipe is arranged, the Field Service Technician will apply the thread compound as they are brought to the rig floor or as the ends are accessible on the pipe rack during the run.

5.3 The Field Service Technician must remain on the tower or rig floor to accept all make-up graphs and notify the rig crew that he will be on the ground applying thread compound on the pipe rack.

5.4 During the running of the casing, the Field Service Technician is responsible for approving all make-up graphs and verifying the placement of the Constrictor® lock point. If the movement of cables, slips, or binding of elevators is observed, all efforts must be made to fix the issue and shall be noted in the comments of the make-up graph and the field service report.

5.5 Fermata® recommends setting the scale (X axis) of the make-up graph to 5-8 turns to obtain a proper make-up profile.

5.6 An encoder should be used and not a proximity switch for counting rotations. Generally, proximity switches do not provide adequate pulses per revolution.

5.7 Fermata® recommends targeting the optimum make-up torque listed on the current connection data sheet. Any make-up torque between the minimum and maximum make-up torque is acceptable, but the optimum make-up torque is ideal for most conditions and common equipment. Add 10% to all specified make-up torque values when using thread locking compound. A Constrictor® lock point must be visible for proper make-up. See Figure 8.

5.8 Before the first connection make-up, set the dump valve to the optimum torque and test on the pipe body to ensure proper tong engagement and that the pipe integrity is not compromised.

5.9 Make-up the first connection to the optimum torque, draw a line across the pin and box, and re-apply the optimum torque (double bump).

5.10 If movement past 0.5" is observed, reapply optimum torque +20% (This may exceed maximum make-up torque, but is acceptable, provided no yielding is observed and the tongs are not compromising the pipe body).

5.11 Repeat 5.9 to 5.10.

5.12 Movement is an indication of excess thread compound. If observed, review the amount of thread compound applied and reduce the amount.

5.13 Continue making up the string to the higher torque value, if necessary.

5.14 Spin in the connection in high gear at Revolutions Per Minute (RPM) at or below that listed in Table 4.

5.15 Move to low gear prior to the Constrictor® lock point (see Figure 8) and keep the RPM at or below that listed in Table 4.

5.16 RPM may occasionally be adjusted based on makeup profile, if approved by Fermata® Field Service Management or Engineering.

5.17 The following (Table 4) is the recommended maximum make-up RPM.

Table 4

Pipe Diameter	High Gear Not to Exceed	Low Gear Not to Exceed
4-1/2" to 5-1/2"	20 RPMs	5 RPMs
7" to 7-5/8"	15 RPMs	5 RPMs
9-5/8" and greater	10 RPMs	3 RPMs

5.18 Verify the make-up result against the torque-turn graph to ensure that there were no abnormal make-up scenarios that could affect the make-up and performance of the connection.

5.19 The Constrictor® Lock Point is the point on the graph where the torque-turn slope begins to change from curved to linear. It is required to be between 5% and 80% of makeup torque. See Figure 8.

5.20 Once the Constrictor® Lock Point is achieved, the graph should continue a linear profile with no decrease in slope. See figures 9 and 10 for examples of unacceptable graphs where a decrease in slope is observed after the Constrictor® Lock Point.

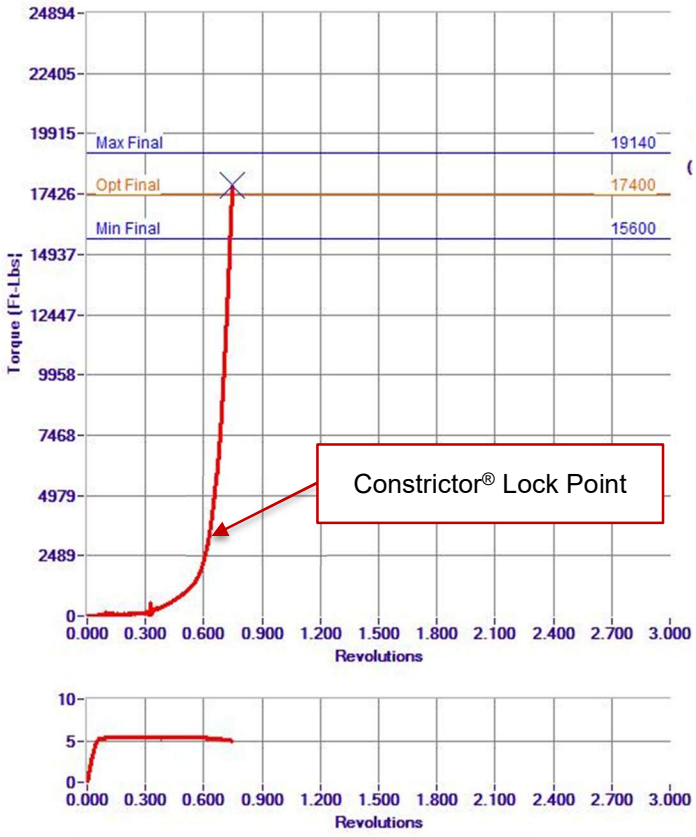

Figure 8: Example of a Proper Make-Up Graph

5.21 Figures 9 and 10 are examples of unacceptable graphs where too much thread compound was applied.

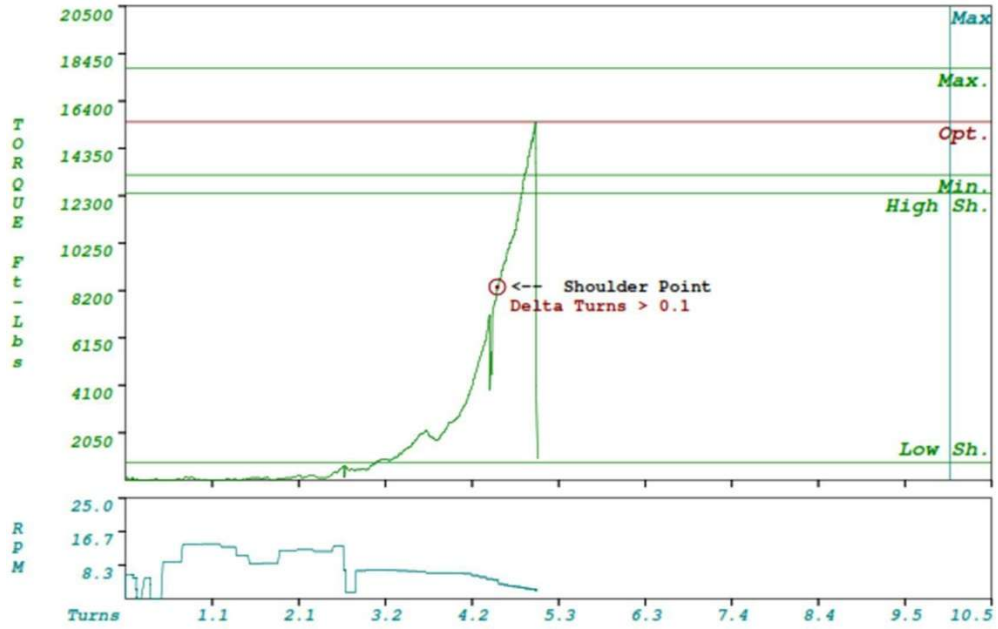

Figure 9: Unacceptable Make-Up Graph

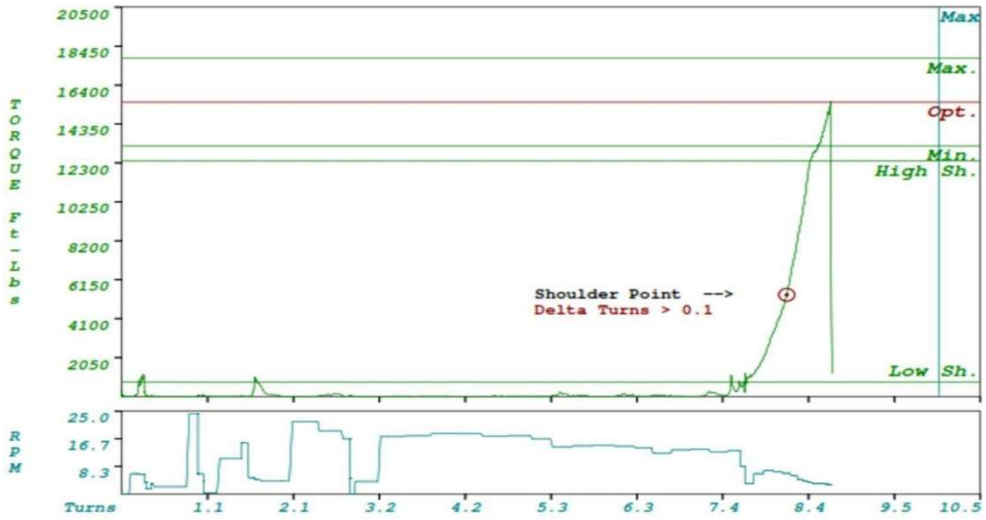

Figure 10: Unacceptable Make-Up Graph

5.22 Verification of proper Bushmaster® SL connection make-up can be made by checking that the box face falls within the knurl marking on the pin/pipe body, or that the base of the triangle is aligned within +.062" of the box face.

5.23 Knurl band acceptable coverage is 50% - 100% of pipe circumference.

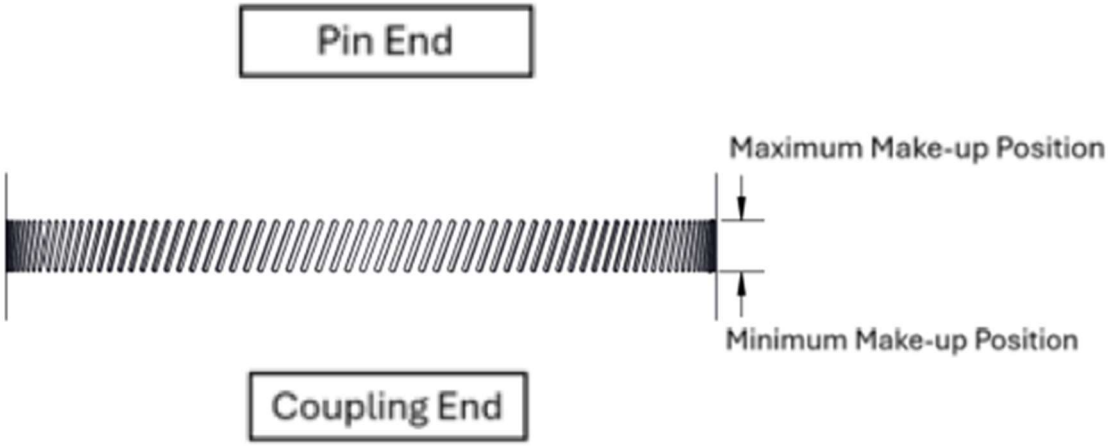

Figure 11: Knurl Band Tolerance Criteria

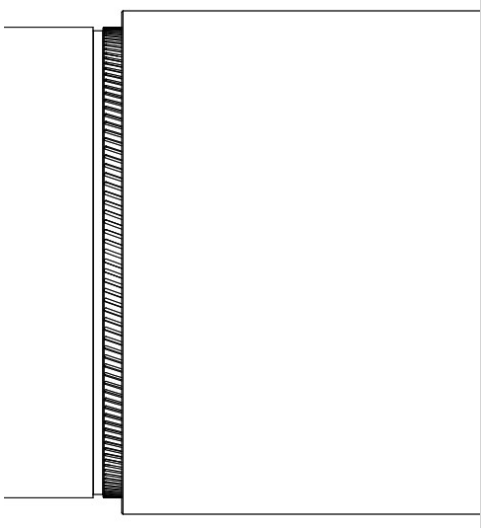

Figure 12: Knurling Area After Box/Pin Make-Up

5.24 For connections with a triangle stamp, a 1” wide X 4” long white paint stripe is applied to the mill and 1” wide X 24” long field end to aid in locating the triangle stamp.

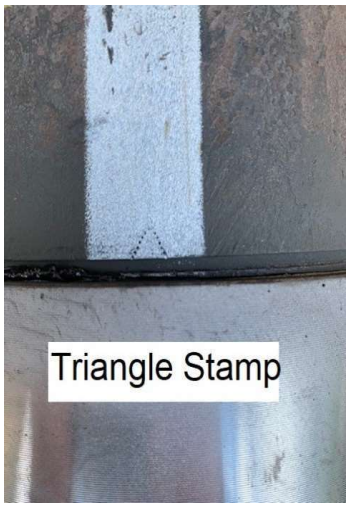

Figure 13: Example of Proper Triangle Stamp Position After Make-Up

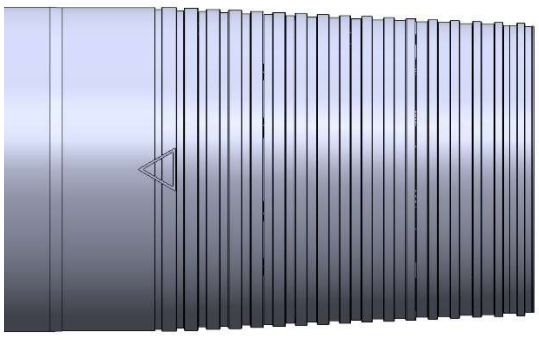

Figure 14: Triangle Stamp Applied to Pin

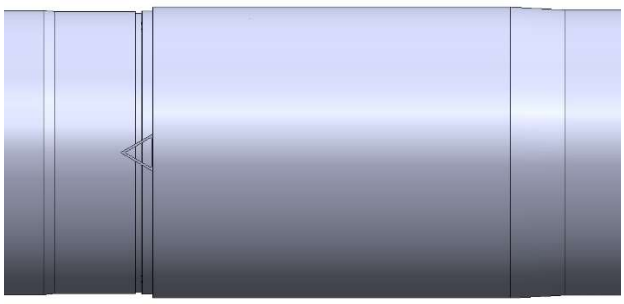

Figure 15: Triangle Stamp Location After Make-Up

6. Downhole Rotation

6.1 The maximum operating torque listed on the current connection data sheet is the maximum torque for downhole rotation unless reviewed and approved by engineering. Speed should not exceed 40 RPM. RPM's and operating torque can be evaluated and adjusted on a case-by-case basis, if approved by the engineering group.

6.2 Take care to gradually increase or decrease rotation speed and torque to prevent potential dynamic loading scenarios.

7. Break-Out and Inspection of Connection

7.1 Verify the back-up tongs are equipped with the appropriately sized dies prior to break-out of the connection.

7.2 Place the back-up tongs on the pipe body below the threaded area of the box.

7.3 Break-out the connection in low gear to ensure adequate torque capability.

7.4 Keep break-out speed low to prevent galling (preferably 5 RPM or less)

7.5 Break-out the connection slowly until the pin "jumps", indicating disengagement.

7.6 Use a stabbing guide prior to disengagement to prevent damage to the connection.

7.7 Alignment is equally important during the connection break-out as during make-up. Verify alignment prior to break-out of the connection.

7.8 If it is necessary to re-run the connection, make sure to fully break-out the connection, remove all thread compound and debris, inspect the connection for damage (galling/gouging), and follow the make-up procedure outlined in Section 5.

7.9 When necessary to lay down the string, the connection must be stored and covered with an approved storage compound and covered with the proper sized thread protectors. Ensure that the thread protectors are clean and free of grime, debris and foreign contaminants.

7.10 All used, rejected, and/or repairable pipe left at the rig location must be identified, tagged and categorized based on the chart shown in figure 16, and must be submitted to Field Service Management as soon as possible via email.

Summary of Pipe left on Rig Location

Customer: _____ **Rig:** _____ **Well Name:** _____

String 1	String 2	
		Prime Joints, conduct VTI leave insructions to apply storage compound prior to having thread protectors placed back on. (Joints that never left the pipe rack)
String 1	String 2	
		Rig Returns, identified by **1 White band** near mill end & **1 Yellow band** at repairable end / area. (Joints that were made up never went below the rig floor, broken out, laid down, and passed VTI.)
String 1	String 2	
		Used Pipe, identified by a **1 Orange band** 6 inches each side of the defect, damage, or made up end and near the mill end. (Joints failed VTI or went below rig floor.)
String 1	String 2	
		Rejected Pipe, identified by a **1 Red band** 6 inches each side of the defect, damage, or made up end and near the mill end. (Joints rejected with signs of galling, pitting, or other damage.)

Figure 16: Pipe Classification Summary