

Field Running Procedure of FLUSHMAX-II and FLUSHMAX-IIIRev.18: **Added new size (6-5/8" x 28.0# and 32.0#)****NOTE:**

- For the FLUSHMAX Series connections (FLUSHMAX, FLUSHMAX-II and FLUSHMAX-III) each connection is unique based on Wall Thickness and Outside Diameter.
Connections within the FLUSHMAX Series are **NOT INTERCHANGEABLE** unless the Wall Thickness and Outside Diameter of the two connections are the same.
- Thread galling of gall-prone materials (martensitic chromium steels and CRA) occurs during movement—stabbing or pulling and makeup or breakout. Galling resistance of threads is primarily controlled in two areas—surface preparation and finishing during manufacture and careful handling practices during running and pulling. Threads and lubricant must be clean. Assembly in the horizontal position should be avoided. Connections should be turned by hand to the hand-tight position before slowly power tightening. The procedure should be reversed for disassembly.

1. Running Precaution

- 1.1 Pipe shall not be stacked higher than five tiers at the rig.
- 1.2 Wooden dunnage shall be placed between successive layers.
- 1.3 Thread protector should always remain in place when moving or handling.
- 1.4 Avoid rough handling. Do not unload pipe by dropping.

2. Running Preparation

- 2.1 Thread compound that was applied to the connections may have been contaminated during storage and should be removed prior to running operations. The handling plugs that are used in the running operation for the FLUSHMAX-II and FLUSHMAX-III connection require the box connection to be properly cleaned prior to installation of the handling plug.
- 2.2 Diesel oil shall not be used to clean connections.
- 2.3 Ensure the thread compound is available
API modified or Best-O-Life 2000 is recommended unless customer specifies otherwise.
- 2.4 Handling Plug should be installed before lifting FLUSHMAX-II or FLUSHMAX-III.
- 2.5 Locking slip type elevators are recommended (not spring loaded type elevators) and should be of the correct size and length to accommodate the casing.
Make certain that the slip type elevators are in good working condition, so as to not cause ovality in the pipe.
Use low / non-marking, non-ferrous dies for chrome and CRA pipe.

- 2.5 You should not use collar type elevators on this size of material as this would put all of the string weight onto the face of the handling plug that was screwed into the box connection.
- 2.6 Check for traveling block alignment.
 - Power tongs with lead line at 90 degrees and level with tong.
 - Ensure that accurate torque monitoring device is available.
 - Use low / non-marking, non-ferrous dies for chrome and CRA pipe.
- 2.7 Make sure that the meter indicates torque (ft-lbs) or load (lbs).

3 Running

- 3.1 It is recommended to use stabbing guide applied to box of the pipe set in the slip.
- 3.2 Pick-up a joint from the rack to the vee door with the pin protector in place. The box protector should be removed when the joint of pipe is in the vee door of the rig. Install the handling plug into the clean box connection.
 - Make sure the elevator is securely clamped.
- 3.3 Remove the Handling Plug and apply an even coat of thread compound to the box connection with a brush.
- 3.4 Remove the pin protector and apply thread compound on the 100% pin threads with a brush.
- 3.5 Lower joint, pin into box. Ensure alignment before stabbing

4 Make-up

- 4.1 It is critical during the initial stabbing and make-up that the pipe be maintained in a true vertical position. Vertical alignment is that is the position of the pin connections in relationship to the box connection in the rotary table. Vertical alignment must be maintained during the make-up of the connections.
 - The usage of single joint load compensator is recommended as this tool will make stabbing easier and reduce the risk of galling. Strongly recommended for materials that are susceptible to galling such as chrome and CRA pipe.
- 4.2 Make up torque: See Appendix
 - Appendix A Torque Table (ft-lb)
 - Appendix B Torque Table (N-m)

Please contact Metal One Representative for make-up torque of non-listed materials.

4.3 When higher-friction-factor thread compound is used for field running instead of the recommended thread compounds written in this procedure, following conversion shall be applied:

Friction Factor (FF) *	Conversion Coefficient	Conversion of Recommended Torque
0.8 <= FF <= 1.2	1.0.	No conversion: make-up-torque shall be 1.0 x MO recommended make-up torque.
1.2 < FF	FF - 0.2.	• If FF is 1.5 : converted make-up torque shall be 1.3 x MO recommended make-up torque. • If FF is 2.0 : converted make-up torque shall be 1.8 x MO recommended make-up torque. • If FF is 2.5 : converted make-up torque shall be 2.3 x MO recommended make-up torque.

* " Friction Factor" is relative to API RP 5A3

4.4 It is strongly recommended to lower the RPM prior to shouldering less than 10 RPM to avoid over-shooting of torque. In the case where a pressure gauge is used instead of torque meter, the hydraulic pressure equivalent to recommended torque shall be converted from torque - pressure chart.

Chrome and CRA materials are prone to galling, it is strongly recommended to use lower RPM to avoid thread galling.

4.5 For first 10 joints, check make up position.

External shoulder shall be completely closed.

If the external shoulder is not closed, then increase the torque until the shoulder is closed. Torque may be deviated from the recommendation depending on thread compound used, and very hot or very cold temperature may change the friction factor of thread compound.

5 PULLING

5.1 Preparation

5.1.1 Same precaution shall be paid as running

5.1.2 Clean thread protector should be available prior to laying down.

5.2 Breaking out

5.2.1 Back up tong shall be applied on the location about 1 foot from box face.

5.2.2 After breaking loose, great care should be paid not to overspin to prevent galling.

5.2.3 Great care should be exercised to disengage all of the thread before lifting a pipe out of Box connection.

6 Definition in the document

6.1 Handling Plug

Handling plugs are designed to be installed hand tight into the box connection and are used during general running operations and are NOT intended to hold string weight.

6.2 Lifting Plug

Lifting plugs are designed to lift the entire string weight. If the customer needs lifting plugs, then please contact a Metal One representative.

Appendix A Torque Table (ft-lb)

Note) Ope. Max. (Operational Max.) torque can be applied for high torque applications

OD	Nomi. Weit	WT	J55 / K55			L80 / N80			T95 / P110		
in	lbs/ft	in	Min	Max	Ope. Max.	Min	Max	Ope. Max.	Min	Max	Ope. Max.
4 1/4	10.90	0.256	2,100	3,100	3,100	2,400	3,400	3,400	2,700	3,700	3,700
4 1/2	10.50	0.224	2,000	3,000	3,000	2,300	3,300	3,300	2,600	3,600	3,600
	11.60	0.250	2,400	3,400	3,400	2,700	3,700	3,700	3,000	4,000	4,000
	12.60	0.271	2,700	3,700	3,700	3,000	4,000	4,000	3,300	4,300	4,300
	13.50	0.290	2,900	3,900	3,900	3,200	4,200	4,200	3,500	4,500	4,500
	15.10	0.337	3,000	4,000	4,300	3,900	4,900	5,200	5,500	6,500	7,200
5	15.0	0.296	3,200	3,800	4,700	3,700	4,500	5,600	5,000	6,200	7,800
	18.0	0.362	3,700	4,500	5,600	4,400	5,400	6,800	6,200	7,600	9,500
	21.4	0.437	-	-	-	5,400	6,600	8,200	7,600	9,200	11,500
	23.2	0.478	-	-	-	5,900	7,100	8,900	8,100	9,900	12,400
5 1/2	15.5	0.275	3,400	4,200	5,300	4,100	5,100	6,400	5,900	7,100	8,900
	17.0	0.304	3,800	4,600	5,800	4,600	5,600	7,000	6,400	7,800	9,800
	20.0	0.361	4,400	5,400	6,800	5,400	6,600	8,200	7,700	9,300	11,600
	23.0	0.415	5,000	6,200	7,700	6,100	7,500	9,400	8,600	10,600	13,200
6 5/8	17.0	0.250	4,500	5,500	6,900	5,400	6,600	8,300	7,700	9,400	11,700
	20.0	0.288	5,100	6,300	7,900	6,300	7,700	9,600	8,700	10,700	13,400
	24.0	0.352	6,300	7,700	9,600	7,700	9,300	11,600	10,600	13,000	16,200
	28.0	0.417	6,900	8,500	10,500	8,200	10,000	12,500	12,000	14,800	18,500
	32.0	0.475	8,100	9,900	12,400	9,600	11,800	14,800	13,300	16,300	20,400
7	23.0	0.317	5,900	7,300	9,100	7,200	8,800	11,000	10,200	12,400	15,500
	26.0	0.362	7,300	8,900	11,100	8,600	10,600	13,300	12,200	15,000	18,700
	29.0	0.408	8,300	10,100	12,600	10,000	12,200	15,200	14,000	17,000	21,300
	32.0	0.453	9,100	11,100	13,900	11,000	13,400	16,700	15,300	18,700	23,400
7 5/8	26.2	0.328	8,800	10,800	13,500	10,600	13,000	16,300	14,900	18,200	22,800
	29.7	0.375	9,200	11,200	14,000	11,200	13,600	17,000	15,500	18,900	23,600
	33.7	0.430	10,400	12,800	16,000	12,700	15,500	19,400	17,600	21,500	26,900
	35.8	0.465	11,300	13,800	17,300	13,700	16,700	20,900	19,100	23,300	29,100
	39.0	0.500	12,200	15,000	18,700	14,800	18,000	22,500	20,500	25,100	31,400
8	30.5	0.375	11,900	14,500	24,100	14,300	17,500	29,200	20,000	24,400	40,700
	33.8	0.417	11,100	13,500	22,500	13,400	16,400	27,300	-	-	-
8 5/8	32.0	0.352	8,200	10,000	16,700	10,000	12,200	20,300	-	-	-
	36.0	0.400	9,400	11,400	19,000	11,300	13,800	23,000	15,800	19,300	32,100
9 5/8	36.0	0.352	8,600	10,400	20,800	10,400	12,600	25,200	14,500	17,700	35,300
	40.0	0.395	9,500	11,700	23,400	11,600	14,200	28,300	16,200	19,800	39,500
	43.5	0.435	10,500	12,900	25,700	12,800	15,600	31,100	17,700	21,700	43,400
	47.0	0.472	11,400	14,000	28,000	13,900	16,900	33,800	19,400	23,700	47,300
	53.5	0.545	-	-	-	16,000	19,600	39,200	22,300	27,300	54,600
10 3/4	40.5	0.350	10,500	12,900	25,800	12,900	15,700	31,300	-	-	-
	45.5	0.400	12,200	14,800	29,500	14,700	17,900	35,700	-	-	-
	51.0	0.450	13,600	16,600	33,200	16,500	20,100	40,100	23,000	28,000	56,000
	60.7	0.545	15,700	19,100	38,200	18,700	22,900	45,800	26,000	31,800	63,500
	65.7	0.595	17,000	20,800	41,500	20,300	24,800	49,600	28,200	34,400	68,800
11 3/4	42.0	0.333	12,100	14,700	29,300	14,600	17,800	35,500	20,300	24,900	49,700
	47.0	0.375	13,600	16,600	33,100	16,400	20,000	40,000	23,000	28,000	56,000
	54.0	0.435	15,700	19,100	38,100	18,900	23,100	46,200	26,500	32,300	64,600
	60.0	0.489	17,600	21,400	42,800	21,200	25,900	51,800	29,600	36,200	72,400
	65.0	0.534	19,200	23,400	46,800	23,100	28,300	56,600	32,400	39,600	79,100
13 3/8	54.5	0.380	14,000	17,200	43,000	17,100	20,900	52,200	-	-	-
	61.0	0.430	15,800	19,400	48,600	19,400	23,600	58,900	27,000	33,000	82,500
	68.0	0.480	17,700	21,700	54,200	21,400	26,200	65,600	30,200	36,800	92,000
	72.0	0.514	19,000	23,200	58,000	23,000	28,100	70,200	32,100	39,300	98,300

Appendix B Torque Table (N-m)

Note) Ope. Max. (Operational Max.) torque can be applied for high torque applications

OD	Nomi. Weit	WT	J55 / K55			L80 / N80			T95 / P110		
mm	kg/m	mm	Min	Max	Ope. Max.	Min	Max	Ope. Max.	Min	Max	Ope. Max.
107.95	16.24	6.50	2,800	4,200	4,200	3,200	4,600	4,600	3,600	5,000	5,000
114.30	15.65	5.69	2,700	4,000	4,000	3,100	4,400	4,400	3,500	4,800	4,800
	17.28	6.35	3,200	4,600	4,600	3,600	5,000	5,000	4,000	5,400	5,400
	18.77	6.88	3,600	5,000	5,000	4,000	5,400	5,400	4,400	5,800	5,800
	20.12	7.37	3,900	5,200	5,200	4,300	5,600	5,600	4,700	6,100	6,100
	22.50	8.56	4,000	5,400	5,800	5,200	6,600	7,000	7,400	8,800	9,700
127.00	22.35	7.52	4,300	5,100	6,300	5,000	6,100	7,500	6,700	8,400	10,500
	26.82	9.19	5,000	6,100	7,500	5,900	7,300	9,200	8,400	10,300	12,800
	31.89	11.10	-	-	-	7,300	8,900	11,100	10,300	12,400	15,500
	34.57	12.14	-	-	-	8,000	9,600	12,000	10,900	13,400	16,800
139.70	23.10	6.99	4,600	5,600	7,100	5,500	6,900	8,600	8,000	9,600	12,000
	25.33	7.72	5,100	6,200	7,800	6,200	7,500	9,400	8,600	10,500	13,200
	29.80	9.17	5,900	7,300	9,200	7,300	8,900	11,100	10,400	12,600	15,700
	34.27	10.54	6,700	8,400	10,400	8,200	10,100	12,700	11,600	14,300	17,800
168.28	25.33	6.35	6,100	7,400	9,300	7,300	8,900	11,200	10,400	12,700	15,800
	29.80	7.32	6,900	8,500	10,700	8,500	10,400	13,000	11,700	14,500	18,100
	35.76	8.94	8,500	10,400	13,000	10,400	12,600	15,700	14,300	17,600	21,900
	41.72	10.59	9,300	11,500	14,200	11,100	13,500	16,900	16,200	20,000	25,000
	47.68	12.07	10,900	13,400	16,800	13,000	16,000	20,000	18,000	22,100	27,600
177.80	34.27	8.05	8,000	9,800	12,300	9,700	11,900	14,900	13,800	16,800	21,000
	38.74	9.19	9,800	12,000	15,000	11,600	14,300	18,000	16,500	20,300	25,300
	43.21	10.36	11,200	13,600	17,000	13,500	16,500	20,600	18,900	23,000	28,800
	47.68	11.51	12,300	15,000	18,800	14,900	18,100	22,600	20,700	25,300	31,700
193.68	39.04	8.33	11,900	14,600	18,300	14,300	17,600	22,100	20,200	24,600	30,900
	44.25	9.53	12,400	15,100	18,900	15,100	18,400	23,000	21,000	25,600	32,000
	50.21	10.92	14,100	17,300	21,600	17,200	21,000	26,300	23,800	29,100	36,400
	53.34	11.81	15,300	18,700	23,400	18,500	22,600	28,300	25,800	31,500	39,400
	58.11	12.70	16,500	20,300	25,300	20,000	24,400	30,500	27,700	34,000	42,500
203.20	45.45	9.53	16,100	19,600	32,600	19,300	23,700	39,500	27,100	33,000	55,100
	50.36	10.59	15,000	18,300	30,500	18,100	22,200	37,000	-	-	-
219.08	47.68	8.94	11,100	13,500	22,600	13,500	16,500	27,500	-	-	-
	53.64	10.16	12,700	15,400	25,700	15,300	18,700	31,100	21,400	26,100	43,500
244.48	53.64	8.94	11,600	14,100	28,200	14,100	17,000	34,100	19,600	24,000	47,800
	59.60	10.03	12,800	15,800	31,700	15,700	19,200	38,300	21,900	26,800	53,500
	64.82	11.05	14,200	17,400	34,800	17,300	21,100	42,100	24,000	29,400	58,800
	70.03	11.99	15,400	18,900	37,900	18,800	22,900	45,800	26,300	32,100	64,100
	79.72	13.84	-	-	-	21,600	26,500	53,100	30,200	37,000	74,000
273.05	60.35	8.89	14,200	17,400	34,900	17,400	21,200	42,400	-	-	-
	67.80	10.16	16,500	20,000	40,000	19,900	24,200	48,400	-	-	-
	75.99	11.43	18,400	22,500	45,000	22,300	27,200	54,300	31,100	37,900	75,900
	90.44	13.84	21,200	25,800	51,700	25,300	31,000	62,100	35,200	43,100	86,100
	97.89	15.11	23,000	28,200	56,200	27,500	33,600	67,200	38,200	46,600	93,200
298.45	62.58	8.47	16,400	19,900	39,700	19,700	24,100	48,100	27,500	33,700	67,300
	70.03	9.53	18,400	22,500	44,800	22,200	27,100	54,200	31,100	37,900	75,900
	80.46	11.05	21,200	25,800	51,600	25,600	31,300	62,600	35,900	43,700	87,500
	89.40	12.42	23,800	29,000	58,000	28,700	35,100	70,200	40,100	49,000	98,100
	96.85	13.56	26,000	31,700	63,400	31,300	38,300	76,700	43,900	53,600	107,200
339.73	81.21	9.65	18,900	23,300	58,300	23,100	28,300	70,700	-	-	-
	90.89	10.92	21,400	26,300	65,900	26,300	32,000	79,800	36,600	44,700	111,800
	101.32	12.19	24,000	29,400	73,400	29,000	35,500	88,900	40,900	49,900	124,700
	107.28	13.06	25,700	31,400	78,600	31,100	38,100	95,100	43,500	53,200	133,200