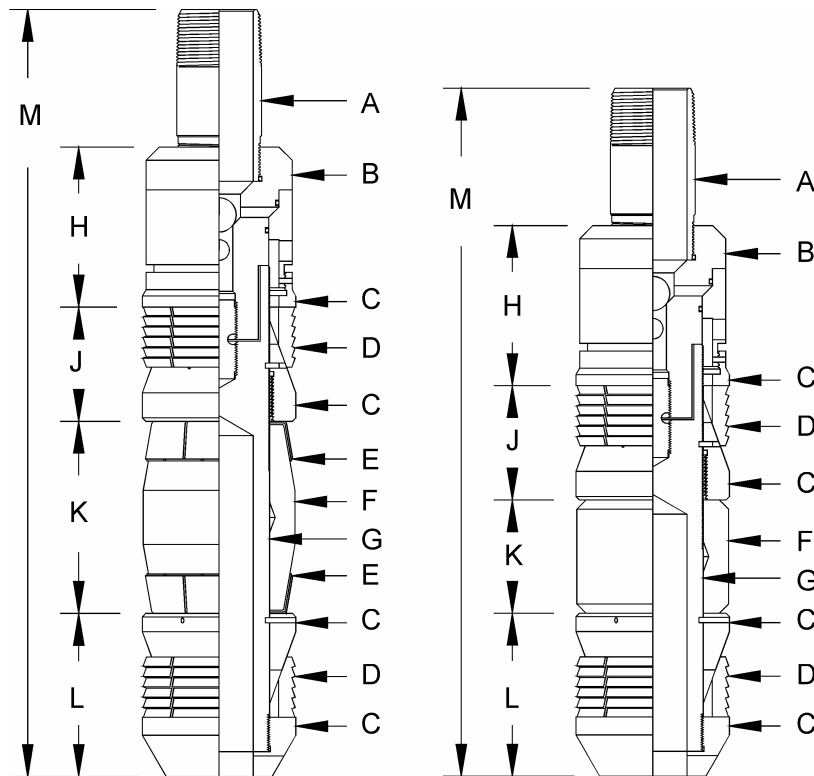


# H-M Bridge Plug

## DIMENSIONAL DATA

Plug Size O.D.	A	B	C	D	E	F	G	H	J	K	L	M
<b>2.75 P</b>	2.093	2.750	2.750	2.671	2.687	2.687	1.500	7.000	2.453	5.093	4.078	23.531
<b>3.12 P</b>	2.600	3.120	3.120	3.062	3.062	3.062	1.875	6.281	2.395	5.250	3.952	22.781
<b>3.50 P</b>	2.600	3.500	3.500	3.421	3.437	3.437	2.125	8.531	3.455	5.470	4.733	27.187
<b>3.50 E</b>	2.600	3.500	3.500	3.421	n/a	3.437	2.125	8.531	3.455	2.890	4.733	24.687
<b>3.71 P</b>	2.600	3.500	3.710	3.625	3.648	3.648	2.125	8.531	3.455	5.470	4.733	27.187
<b>3.71 E</b>	2.600	3.500	3.710	3.625	n/a	3.648	2.125	8.531	3.455	2.890	4.733	24.687
<b>4.24 P</b>	2.600	3.500	4.240	4.187	4.187	4.187	2.750	8.531	3.623	5.390	5.028	27.375
<b>4.24 E</b>	2.600	3.500	4.240	4.187	n/a	4.187	2.750	8.531	3.623	3.890	5.028	25.875
<b>4.75 P</b>	2.600	3.500	4.750	4.687	4.687	4.687	2.750	8.531	3.623	5.390	5.028	27.375
<b>5.34 P</b>	3.100	5.340	5.340	5.281	5.260	5.260	3.687	9.125	4.151	7.250	5.932	31.125
<b>5.34 E</b>	3.100	5.340	5.340	5.281	n/a	5.260	3.687	9.125	4.151	4.915	5.932	28.781
<b>5.61 P</b>	3.100	5.340	5.610	5.562	5.546	5.546	3.687	9.125	4.151	7.250	5.932	31.125
<b>5.61 E</b>	3.100	5.340	5.610	5.562	n/a	5.546	3.687	9.125	4.151	4.915	5.932	28.781
<b>6.09 P</b>	3.100	5.340	6.090	6.015	5.968	5.968	4.125	11.031	3.860	8.859	7.132	35.437
<b>6.96 P</b>	3.100	5.340	6.960	6.875	6.843	6.843	4.625	11.031	4.900	9.796	7.400	37.687
<b>7.71 P</b>	3.100	5.340	7.710	7.640	7.593	7.593	5.125	11.031	5.125	10.046	7.625	38.375
<b>8.71 P</b>	3.100	5.340	8.710	8.640	8.593	8.593	5.687	11.031	4.867	10.562	8.235	39.250
<b>9.50 P</b>	3.100	5.340	9.500	9.375	9.375	9.375	6.750	10.781	5.644	10.562	9.011	40.781
<b>11.56 P</b>	3.100	5.340	11.56	11.437	11.437	11.437	9.000	11.531	5.750	10.609	8.250	41.156
<b>12.00 P</b>	3.100	5.340	12.00	11.875	11.875	11.875	9.000	11.531	5.750	10.609	8.250	41.156
<b>14.25 P</b>	3.100	5.340	14.25	14.125	14.125	14.125	11.500	11.343	6.985	8.859	10.235	41.750
<b>17.25 P</b>	3.100	5.340	17.25	17.125	17.125	17.125	14.000	10.843	6.901	7.609	9.401	40.312

The figures contained herein are subject to change without notice.  
Some sizes differ slightly from the illustrations shown



Model P

Model E

## Alpha Oil Tools Guidelines for Running H-M Bridge Plugs:

### **RECOMMENDED PROCEDURE BEFORE RUNNING H-M BRIDGE PLUG:**

1. Run a casing scraper (if necessary) to clean inner wall of casing and free any debris or obstructions.
2. Circulate well to clean well of debris and junk.
3. Check casing I.D. 2 ft.-3 ft. below setting depth to insure no restrictions exist.

### **MAKE-UP PROCEDURE:**

1. Make up tubing on tubing adapter by placing back-up on tubing adapter and rotate tubing to the right until tight.
2. **DO NOT REMOVE TUBING ADAPTER FROM PLUG TO MAKE-UP!!**

### **RUNNING IN:**

1. Run into well at uniform rate - no faster than 30 seconds per 90 foot stand. Be certain tubing is free of debris and excessive scale.
2. Avoid unnecessary right-hand rotation of tubing string.
3. Use slow starts and stops when moving tubing string - no jerking.

### **SETTING H-M PLUG:**

1. Run tubing to desired setting point. Never set in collars or where milling has occurred. Set in static conditions (no fluid or gas movement).
2. Drop ball down tubing string - the ball should be 1 1/4 diameter. Allow approximately 5 minutes per 1000 feet for ball to travel in water. More time is needed in mud or viscous fluids.
3. Apply pump pressure to tubing string until 2000 p.s.i. is reached. This pressure will stroke cylinder down into slip. The slip will break into segments and make contact with casing.

NOTE: If you lose pressure before reaching 2000 p.s.i., go on to the next step. In heavier weights of casing, slip and hydro sleeve travel is limited which prevents pressure loss. Simply stop at 2000 p.s.i. and proceed to the next step.

4. Bleed pressure and pull recommended tension above the pipe weight at the tool, to complete setting the plug. Hold tension for 3 to 5 minutes. It is recommended to calculate tubing stretch versus using weight indicator for true pull. See formula below.
5. The tubing string may be released from the H-M Plug by pulling 500 lbs. tension at the tool and rotating the workstring 9 turns to the right at the tool.

PLUG Size OD	SETTING FORCES	
	Minimum Tension	Maximum Tension
2.75	9,000 lbs.	12,000 lbs.
3.12	20,000 lbs.	25,000 lbs.
3.50-4.75	22,000 lbs.	30,000 lbs.
5.34-6.09	30,000 lbs.	45,000 lbs.
6.96-7.71	35,000 lbs.	48,000 lbs.
8.71-9.50	35,000 lbs.	48,000 lbs.
11.56-12.00	35,000 lbs.	48,000 lbs.
14.25-17.25	40,000 lbs.	48,000 lbs.

### **SPECIAL NOTE: For low fluid level wells**

In low fluid level wells, any fluids placed in the tubing after the setting ball has reached it's seat, will tend to shear the cylinder downward on the H-M Bridge Plug. Chart #1 shows the pressure created in psi. per barrel of fluid added, and Chart #2 shows the feet of fill-up per barrel of fluid added. Since 2000 psi. pressure in favor of the tubing at the tool is required to initiate the setting sequence, we suggest the following method for calculating the required applied pump pressure.

1. Determine fluid weight in pounds per gallon (#/gal) or p.s.i. per foot (psi/ft).
2. Estimate fluid level from surface of well. NOTE: The tubing string will fill during running in through the fluid fill ports.
3. From Chart #1, select the appropriate column for the size of tubing string and line for appropriate fluid weight.
4. From Chart #2, select the appropriate column for the size of tubing string and determine the lineal feet per barrel of fluid.
5. Multiply the depth of fluid level from surface by the lineal feet per barrel from Chart #2 to determine the required amount of barrels of fluid to fill the tubing string.
6. Multiply the barrels required to fill the tubing string by the psi. barrel figure from Chart #1. This figure will give you the total hydrostatic head exerted by the fluid in the tubing string when completely filled. If this figure is less than the required 2000 psi., sufficient pump pressure must be added to achieve the 2000 p.s.i. required pressure. In those cases where the calculated pressure for the fluid to fill the tubing string exceeds the required 2000 p.s.i., you need only to add or fill with the necessary barrels of fluid to achieve the required 2000 p.s.i. This may be calculated by dividing 2000 p.s.i. by the psi. per barrel figure from Chart #1. Over pressuring cannot occur since the tool will be activated at 2000 p.s.i. and the downward travel of the cylinder will vent the excess

fluid into the annulus above the plug before damage occurs. Once the required pressure is created at the plug, sufficient tension must be applied as shown in step #4 under setting H-M plug. Complete setting sequence as described in step #5.

**To Calculate Stretch To Set:**

$$S = ( F \times L \times 12 ) / ( E \times A ) = \text{Elongation due to tension (inches)}$$

F = Tension pulled over normal weight (pounds)  
 E = 30,000,000 = Modulus of elasticity for steel

L = Length of running-in string (feet)  
 A = Cross-sectional area of running-in string (square inches)

**Chart # 1**

Mud Wt. API GR #/GAL.	PSI/FT	2 3/8 EU Tubing 4.7 #/FT.	2 7/8 EU Tubing 6.5 #/FT.	2 7/8 IU Drill Pipe 10.4 #/FT.	3 1/2 IU Drill Pipe 13.3 #/FT.
8.34	.433	111.09	74.8	97.6	58.9
9.0	.468	120.8	80.7	105.4	63.6
9.2	.478	123.5	28.5	107.8	65.0
9.4	.488	126.1	84.3	110.1	66.4
9.6	.499	128.8	86.1	112.4	67.8
9.8	.509	131.5	87.9	114.8	69.2
10.0	.519	134.2	89.7	117.1	70.7
10.2	.530	136.9	91.4	119.5	79.1
10.4	.540	139.6	93.2	121.8	73.5
10.6	.551	142.2	95.0	124.2	74.9
10.8	.561	144.9	96.8	126.5	76.3
11.0	.571	147.6	98.6	128.8	77.7
11.2	.582	150.3	100.4	131.2	79.1
11.4	.592	153.0	102.2	133.5	80.5
11.6	.603	155.7	104.0	135.9	82.0
11.8	.613	158.3	105.8	138.2	83.4
12.0	.623	161.0	107.6	140.6	84.8
12.2	.634	163.7	109.4	142.9	86.2
12.4	.644	166.4	111.2	145.2	87.6
12.6	.655	169.1	113.0	147.6	89.0
12.8	.665	171.8	114.8	149.9	90.4
13.0	.675	174.5	116.5	152.3	91.8
13.2	.686	177.1	118.3	154.6	93.3
13.4	.696	179.8	120.1	157.0	94.7
13.6	.706	182.5	121.9	159.3	96.1
13.8	.717	185.2	123.7	161.6	97.5
14.0	.727	187.0	125.5	164.0	98.9
14.5	.753	194.6	130.0	169.8	102.4
15.0	.779	201.3	134.5	175.7	106.0
15.5	.805	208.0	139.0	181.6	109.5
16.0	.831	214.7	143.4	187.4	113.0
16.5	.857	221.4	147.9	193.3	116.6
17.0	.883	220.1	152.4	199.1	120.1
17.5	.909	234.8	156.9	205.0	123.6
18.0	.935	241.5	161.4	210.8	127.2
18.5	.961	248.3	165.8	216.7	130.7
19.0	.987	255.0	170.3	222.6	134.2
19.5	1.01	261.7	174.8	228.4	137.8
20.0	1.04	268.4	179.3	234.3	141.3

**Chart # 2**

O.D.	Wt. (lbs./ft.)	Barrels per Lineal Ft.	Lineal Ft. per Barrel	A
2 3/8	4.7 EU	.003870	258.4	1.304
2 3/8	4.6 NU	.003870	258.4	1.304
2 7/8	6.5 EU	.005794	172.6	1.812
2 7/8	6.4 NU	.005794	172.6	1.812
2 7/8	10.4 IU DP	.004404	222.5	2.858
3 1/2	13.3 IU DP	.007421	134.7	2.915