

Supersedes **All previous catalog materials**

**ENGINEERING data**  
**CABLE SELECTION FOR**  
**3 PHASE - 60 HERTZ SERVICE**

HP	Volts	SF. Amps	Wire Size AWG. #												
			12	10	8	6	4	2	1	1/0	2/0	3/0	4/0	250	300
Maximum Length - Control Panel to Motor															
5	208	20	186	294	519	720	1109	1680							
	230	17.6	235	370	650	905	1393	-							
	460	8.3	995	1568	2780	-	-	-							
	575	7	1475	2325	-	-	-	-							
7.5	208	29	-	203	358	496	764	1160	1414						
	230	25.5	-	255	450	624	961	1457	-						
	460	12.7	650	1025	1803	-	-	-	-						
	575	10.2	1012	1595	-	-	-	-	-						
10	208	37	-	-	280	390	600	908	1108	1230					
	230	33	-	-	347	482	743	1126	1374	-					
	460	16.5	500	789	1388	-	-	-	-	-					
	575	13.2	781	1232	2169	-	-	-	-	-					
15	308	57	-	-	-	252	390	590	720	800	953	1121	1317		
	230	49	-	-	-	325	500	758	925	1027	1226	-	-		
	460	245	-	531	935	1300	-	-	-	-	-	-	-		
	575	197	523	825	1453	-	-	-	-	-	-	-	-		
20	208	70		-	-	-	316	480	585	650	776	913	1072	1155	
	230	63		-	-	252	390	590	720	800	953	1122	-	-	
	460	31.5		413	727	1011	1557	-	-	-	-	-	-	-	
	575	25		650	1145	1592	-	-	-	-	-	-	-	-	
25	208	87		-	-	-	261	395	482	535	639	752	883	951	
	230	78		-	-	-	314	476	581	645	770	906	1064	1146	
	460	59		-	587	816	1257	-	-	-	-	-	-	-	
	575	31.5		516	910	1264	-	-	-	-	-	-	-	-	
30	208	102			-	-	-	329	402	446	532	627	736	793	
	230	92			-	-	-	404	492	547	653	768	902	972	
	460	46			498	692	1066	1616	-	-	-	-	-	-	
	575	37			773	1076	1657	-	-	-	-	-	-	-	
40	208	134						-	306	339	405	477	560	603	
	230	121							375	416	496	584	686	739	
	460	61				522	805	1218	1486	-	-	-	-	-	
	575	49				812	1251	1896	-	-	-	-	-	-	
50	208	173									314	369	434	467	
	230	156									385	453	532	573	
	460	72					628	953	1162	1291	-	-	-	-	
	575	63					632	973	1474	-	-	-	-	-	

**Notes:**

These tables list the minimum average AWG size and maximum length of copper cable for use with Submersible Motors. The selections are for three-phase, 60 Hz systems and comply with U.S. and Canadian electric code ampacities for copper conductors in an overall jacket or as a single conductor, based on the temperature rating of the conductor at 75°C. Also, the selected cable will maintain a minimum voltage of 95% of control panel voltage at the motor, based on motor service-factor amps shown on column 3 of the chart. Please note guidelines applicable to cable selection may vary with local codes and conditions of service.



**ENGINEERING data**  
**CABLE SELECTION FOR**  
**3 PHASE - 60 HERTZ SERVICE**

HP	Volts	SF. Amps	Wire Size AWG. #												
			4	2	1	1/0	2/0	3/0	4/0	250	300	350	400	500	600
Maximum Length - Control Panel to Motor															
60	460	90	-	825	1007	1119	1335	1569							
	575	71	863	1308	1596	1773	2115	-							
75	460	110	-	675	824	915	1042	1285							
	575	87	704	1068	1303	1447	-	-							
100	460	144		-	-	750	834	982	1153						
	575	115		808	958	1094	1306	1537	-						
125	460	182				-	660	777	912	982	1097				
	575	144				875	1043	1227	1441	-	-				
150	460	210					-	673	790	851	948	1038			
	575	170					883	1040	1221	1315	-	-			
175	460	248						-	-	721	803	879	937	1041	
	575	200						883	1038	1118	1245	-	-	-	
200	460	280							-	-	712	780	830	922	
	575	225							922	993	1017	1212	-	-	
225	460	322								-	-	-	722	802	
	575	258								866	965	1057	1127	-	
250	460	355									-	-	-	727	
	575	280									890	974	1038	1153	
275	460	400									-	-	-	-	686
	575	317									860	917	1018	1083	
300	460	440										-	-	-	654
	575	345										842	935	995	

**Notes:**

These tables list the minimum average AWG size and maximum length of copper cable for use with Submersible Motors. The selections are for three-phase, 60 Hz systems and comply with U.S. and Canadian electric code ampacities for copper conductors in an overall jacket or as a single conductor, based on the temperature rating of the conductor at 75°C. Also, the selected cable will maintain a minimum voltage of 95% of control panel voltage at the motor, based on motor service-factor amps shown on column 3 of the chart. Please note guidelines applicable to cable selection may vary with local codes and conditions of service..



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**ENGINEERING data**  
**CABLE SELECTION FOR**  
**3 PHASE - 60 HERTZ SERVICE**

HP	Volts	SF. Amps	Wire Size AWG. #												
			4	2	1	1/0	2/0	3/0	4/0	250	300	350	400	500	600
			Maximum Length - Control Panel to Motor												
125	460	182		-	498	553	660	777	912	982	1094	1198			
	575	144		645	787	874	1043	1227	1441	-	-	-			
150	460	210		-	-	480	572	673	790	851	948	1038	1107		
	575	170		546	666	740	883	1039	1221	-	-	-	-		
175	460	248			-	-	485	570	670	720	803	879	938	1041	
	575	200			566	629	751	883	1038	1188	-	-	-	-	
200	460	280				-	-	505	593	638	711	779	830	922	
	575	225				560	667	785	922	993	1107	-	-	-	
225	460	332					-	439	515	555	618	677	722	802	
	575	258					582	625	804	866	965	1057	-	-	
250	460	355					-	-	467	503	561	614	655	727	
	575	280					536	631	741	798	889	974	1038	-	
275	460	400						-	-	447	498	545	581	645	
	575	317						557	654	705	785	860	917	1018	
300	460	420							-	425	474	519	553	615	
	575	335							619	667	743	814	867	963	
325	460	420							-	425	474	519	553	615	
	575	335							619	667	743	814	867	963	
350	460	475								-	-	460	490	543	
	575	380								588	655	717	765	850	
375	460	560								-	-	436	465	516	
	575	395								566	630	690	736	817	
400	460	560									-	-	415	461	
	575	445									560	612	653	725	

**Notes:**

These tables list the minimum average AWG size and maximum length of copper cable for use with Submersible Motors.

The selections are for three-phase, 60 Hz systems and comply with U.S. and Canadian electric code ampacities for copper conductors in an overall jacket or as a single conductor, based on the temperature rating of the conductor at 75°C.

Also, the selected cable will maintain a minimum voltage of 95% of control panel voltage at the motor, based on motor service-factor amps shown on column 3 of the chart.

Please note guidelines applicable to cable selection may vary with local codes and conditions of service.



**ENGINEERING data**  
**STANDARD SPECIFICATIONS**Supersedes **All previous catalog materials**

Pump shall be designed for pumping water at a rated capacity of \_\_\_\_\_ gallons per minute, \_\_\_\_\_ Ft. total dynamic head (including friction loss.)

**BOWL ASSEMBLY**

Pump bowls shall be of close grained ASTM A48, Class 30, cast iron and shall have porcelain enamel coating of the water passages. Bowls shall have bronze sleeve type bushings to support and guide the shaft. Bushing material shall be bronze, ASTM B505 alloy 836. The intermediate stages shall be provided to protect the suction bearing from abrasives in the liquid pumped. The intermediate stages shall be selected to provide the maximum efficiency with least number of stages. Impeller shall be of the enclosed type, cast of bronze, ASTM B584 alloy 836, accurately cast, machined, balanced, and filed for optimum performance and minimum vibration. The impeller shall be securely fastened to the bowl shaft with taper collets of ASTM A582, Grade 416 stainless steel. Bowl shaft shall be of sufficient diameter to transmit the pump horsepower with a liberal safety factor and rigidly support the impellers between the bowl or case bearings. The bowl shaft material shall be high chrome stainless steel of ASTM A276, Grade 410.

**SUCTION ADAPTER**

Shall be close grained cast iron designed to serve as the suction inlet, the lower bearing housing and the motor adapter piece. The coupling housing portion shall be designed to prevent the entrance of abrasive material into the top end of the motor. The pump suction shall include a stainless steel strainer. The net inlet area shall be equal to at least 5 times the impeller inlet area. The coupling connecting the motor to the pump bowl assembly shall be of sufficient size and strength to withstand maximum torque generated by the motor plus added safety factor. The coupling shall be of 416 stainless steel and keyed or splined to the pump shaft.

**SUBMERSIBLE MOTOR**

The motor shall be of the vertical, submersible, (2) (4) pole induction type designed for continuous duty under-water operation of 3 phase, 60 cycle, (230) (460) (2300) volt alternating current. The motor shall be designed with normal starting torque and low starting current for across-the-line starting. The motor shall have a 1.15 service factor. The motor shall not be loaded in excess of its nameplate rating at design and not be loaded in excess of 110% of its nameplate rating at any condition from zero flow to maximum capacity of the pump. The motor shall be oil-filled or water-filled and shall incorporate a mechanical seal to restrict foreign matter from entering the motor. The thrust bearing shall be of ample capacity to carry the weight of all rotating parts plus the hydraulic thrust and shall be an integral part of the driver. The bearing shall be of such size that the average life rating is based on 5 years continuous operation.

**DISCHARGE PIPE**

The discharge pipe may be furnished in random lengths connected by threaded sleeve couplings. The weight of the pipe shall be no less than stated in AWWA E101, Section 4.5 and shall have ANSI standard tapered pipe threads. The pipe size shall be such that velocities are not less than 4-5 FPS, nor more than 12 FPS.

**SURFACE DISCHARGE ELBOW AND BASE**

The discharge elbow shall be fabricated steel and shall be provided with class 150 ANSI raised face flange of the same diameter as the column pipe. The discharge elbow shall have an integral steel base and lifting lugs of sufficient strength to lift the entire head, column pipe and pump / motor assembly safely for installation and servicing operations. A threaded connection shall be provided in the head base for a terminal box. The base shall also be provided with threaded openings for a well vent and water level indicator.

**SUBMERSIBLE CABLE**

The cable shall be comprised of three separate conductors or a single cable assembly with three conductors. Each conductor shall be insulated by synthetic rubber or plastic insulation suitable for continuous immersion in water. The cable shall be protected with a steel guard where it passes the bowl assembly to prevent damage from contact with the well casing. Stainless steel cable straps shall be provided to support the cable along the riser pipe at intervals of not more than 20 feet. Minimum size of cable shall be as stated in ASAZ specification B58.1, Section B4.3.



Supersedes **All previous catalog materials**

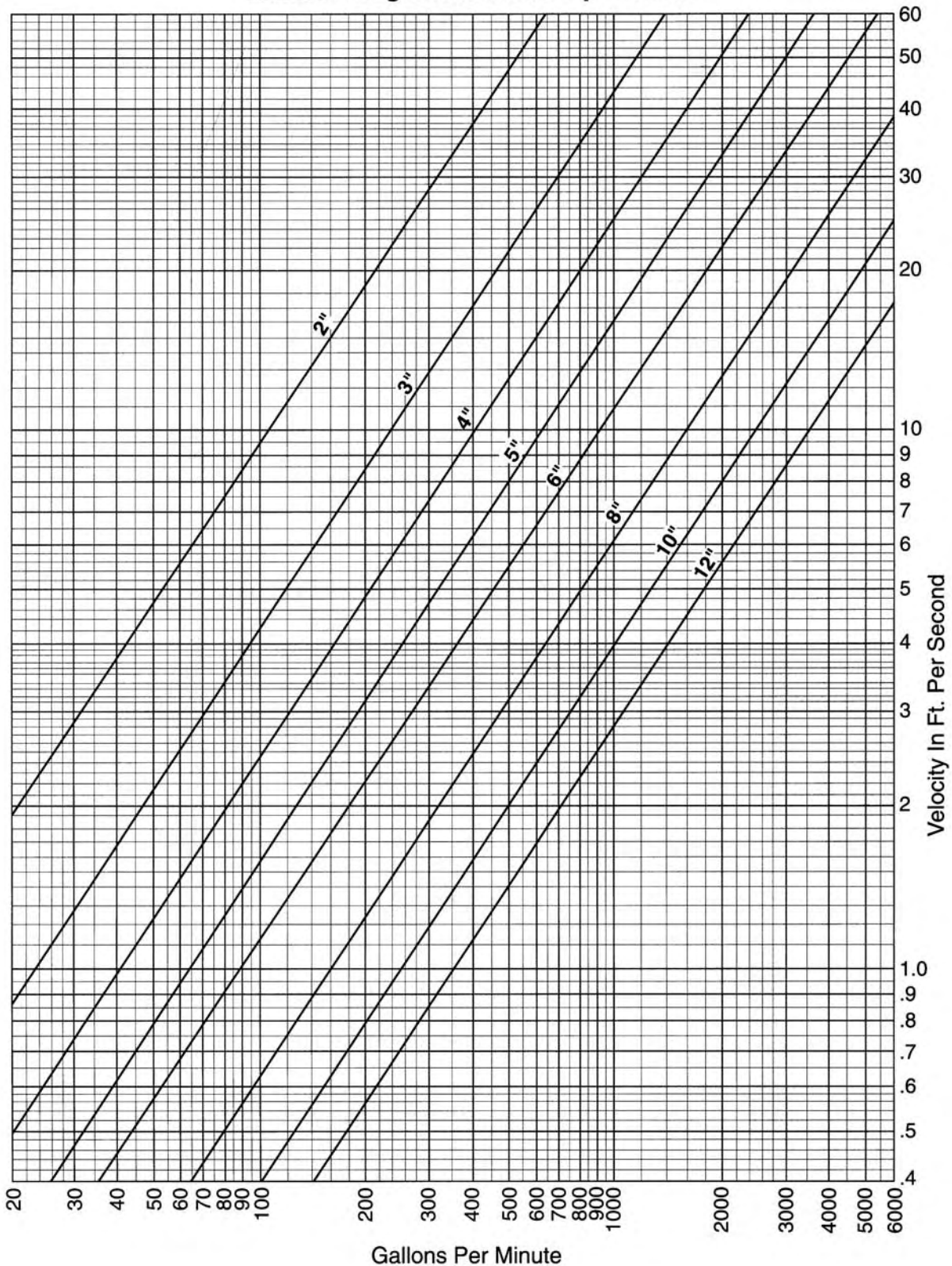
**ENGINEERING data**  
**FRICION LOSS CHART**

U.S. Gallons/Min.	Column Size - Inches								
	3	4	5	6	8	10	12	14	16
50	.77								
60	1.08								
70	1.43								
80	1.83								
90	2.28								
100	2.77	.74							
120	3.88	1.03							
140	5.17	1.38							
160	6.61	1.76	.59						
180	8.21	2.19	.73						
200	9.98	2.66	.89						
220	11.91	3.17	1.06	.43					
240	13.99	3.73	1.24	.50					
260	16.22	4.32	1.44	.59					
280	18.60	4.96	1.65	.68					
300	21.13	5.63	1.88	.77					
350	28.11	7.49	2.49	1.02					
400		9.59	3.19	1.30	.33				
450		11.93	3.97	1.62	.40				
500		14.49	4.83	1.97	.49				
600			6.76	2.77	.69				
700			8.99	3.68	.92	.29			
800			11.51	4.71	1.17	.38			
900			14.31	5.86	1.46	.47	.20		
1000			17.40	7.12	1.79	.58	.24		
1100				8.49	2.15	.68	.29	.17	
1200				9.97	2.53	.80	.34	.20	
1300				11.56	2.94	.94	.40	.24	
1400				13.26	3.39	1.06	.46	.27	.14
1500					3.58	1.20	.52	.31	.16
1600					4.39	1.36	.59	.34	.18
1700					4.93	1.52	.66	.39	.21
1800					5.51	1.68	.73	.43	.23
1900					6.10	1.87	.81	.47	.25
2000					6.73	2.05	.89	.52	.28
2500						3.10	1.35	.79	.42
3000							1.89	1.10	.59
3500							2.52	1.47	.78
4000								1.88	1.00
4500								2.34	1.24
5000								2.84	1.51
6000								3.99	2.12



**ENGINEERING data**  
**VELOCITY CHART**

**Standard Weight Submersible Pipe Column**

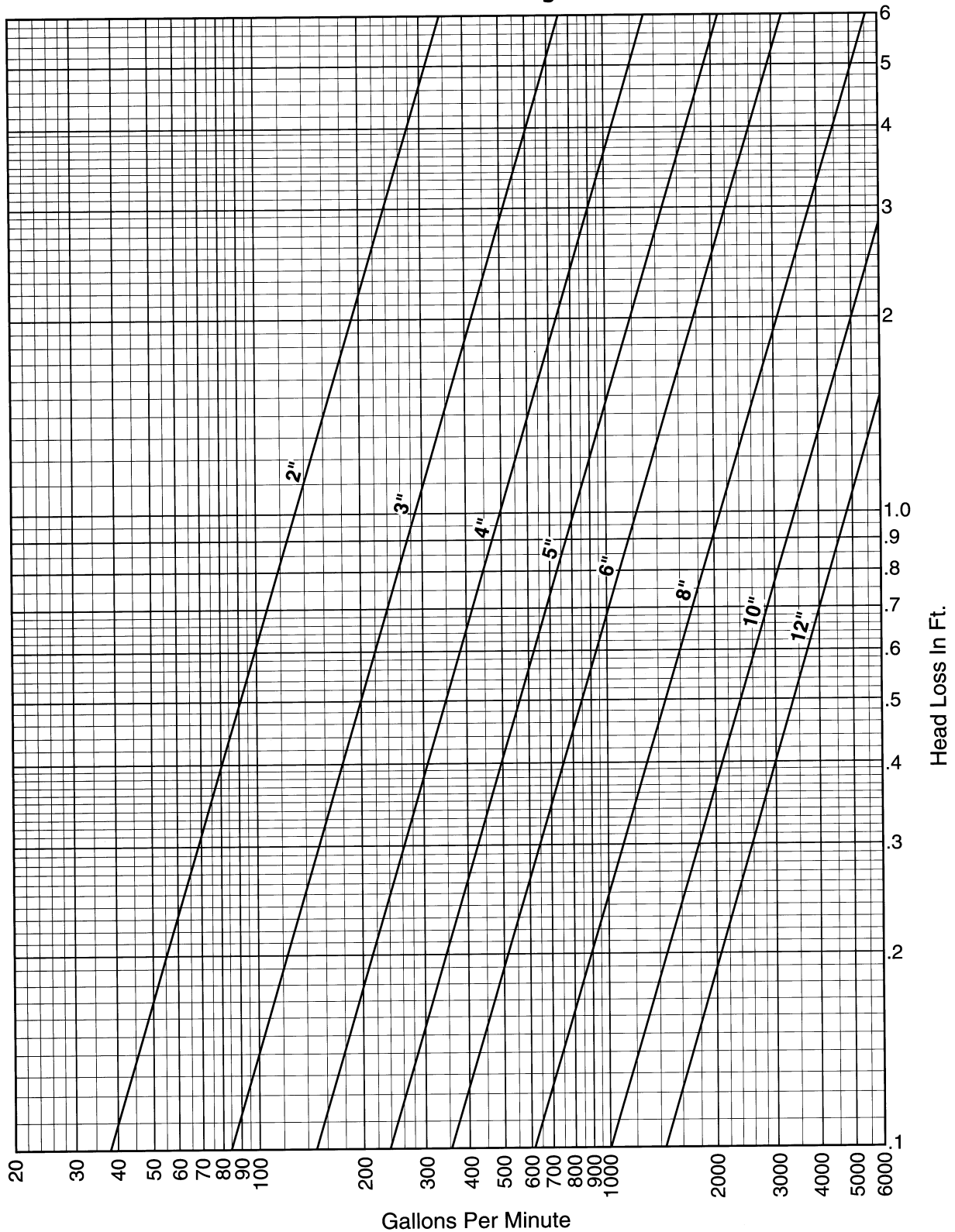


Curves Reflect Typical Performance, Refer to Factory For Certification.



**ENGINEERING data**  
**FRICION LOSS CHART**

**Submersible Discharge Ells**

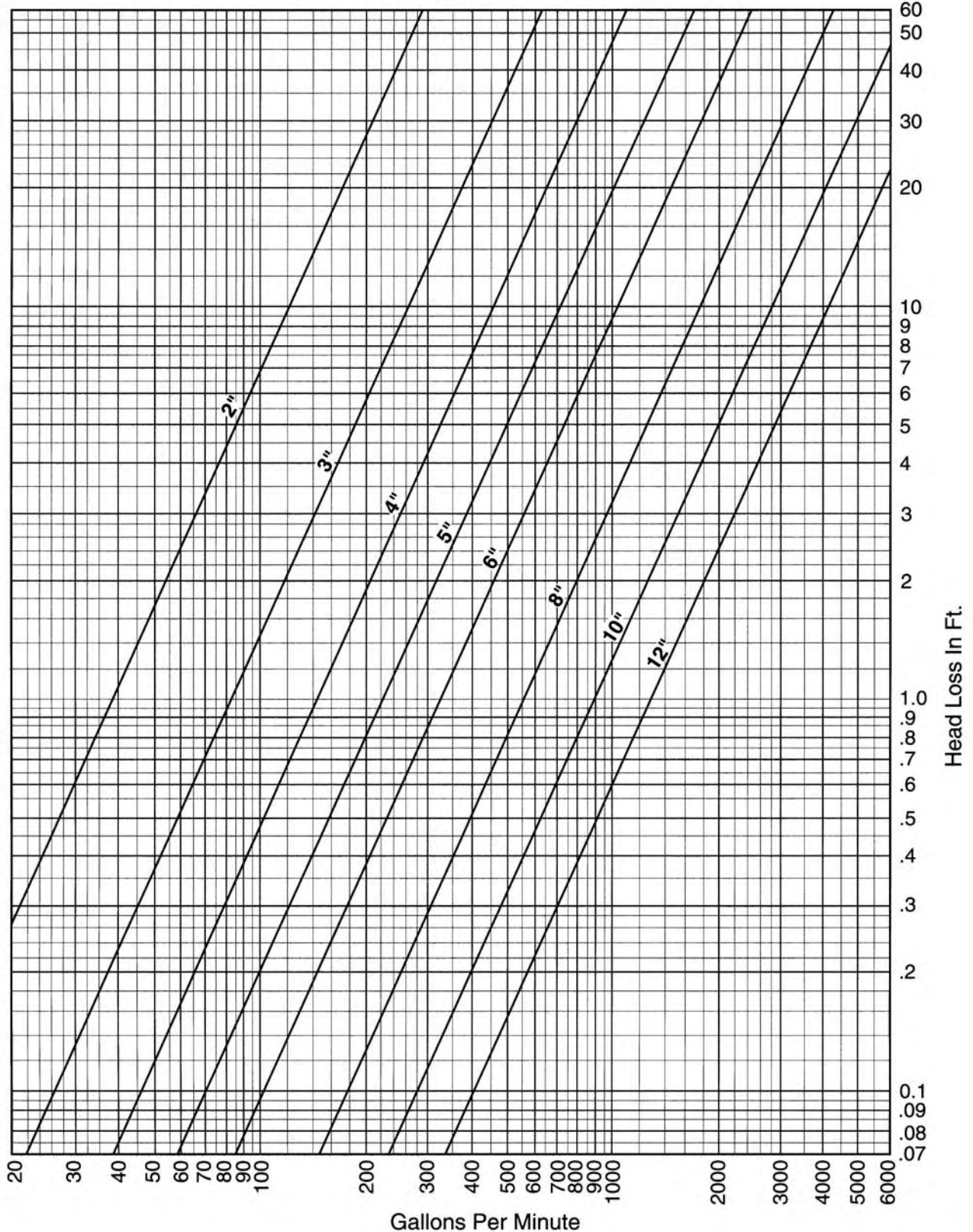


Curves Reflect Typical Performance, Refer to Factory For Certification.



**ENGINEERING data**  
**FRICION LOSS CHART**

**Submersible Pipe Column Check Valves**



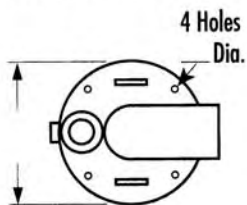
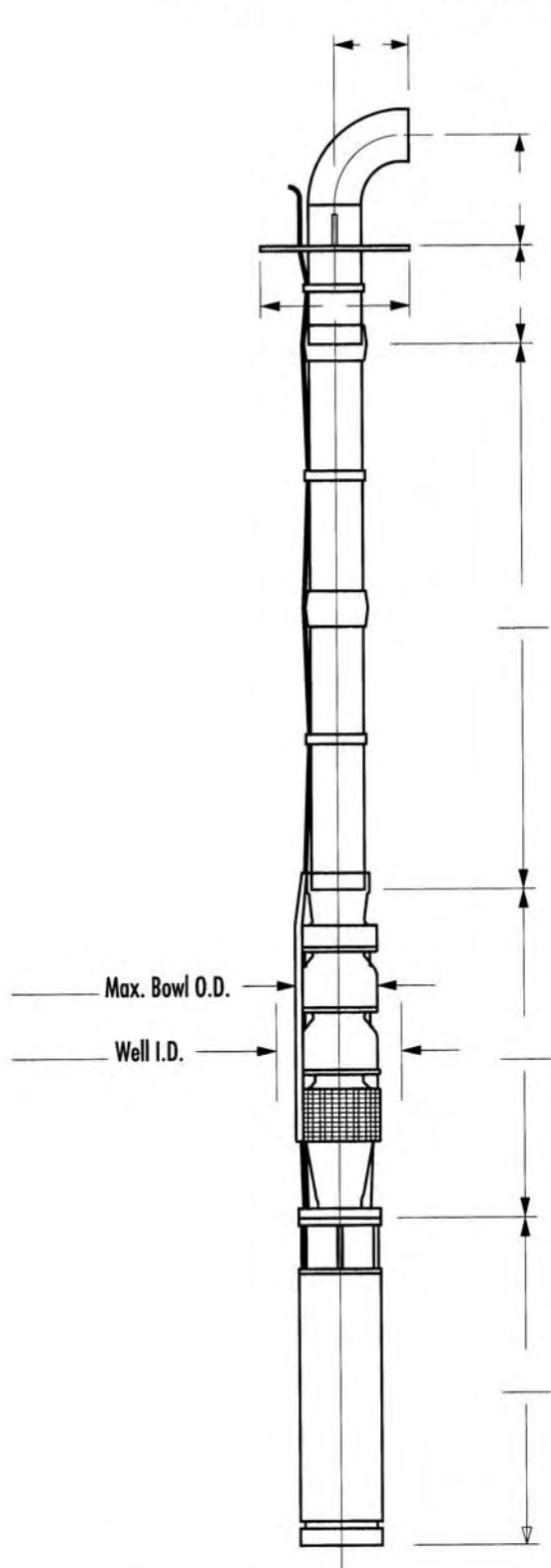
Curves Reflect Typical Performance. Refer to Factory For Certification.





**ENGINEERING data**  
**DISCHARGE ELBOWS**

**SUBMERSIBLE MOTOR DRIVE FABRICATED ABOVE SURFACE DISCHARGE ELBOW - PLAIN END**



Discharge Elbow - Plain End

**NOTES:**

1. All dimensions in inches.
2. Component dimensions may vary  $\pm 1/8"$
3. Not for construction purposes unless certified.
4. The minimum opening must be greater than the largest component dimension. That may be the motor, the column pipe, or the combination bowl diameter and cable guard.
5. The well-to-bowl assembly selection will have to include room for passage of the power cable guard along the bowl assembly length. For purposes of making this allowance, refer to the O.D. of the proposed bowl unit and add to this the dimension shown opposite the motor proposed:
  - 6" motor - 3/4"
  - 8" motor - 1"
  - 10" motor - 1"
  - 12" motor - 1"
  - 14" motor - 2"

It may be possible to lessen these dimensions slightly. Check with the factory if this is necessary.

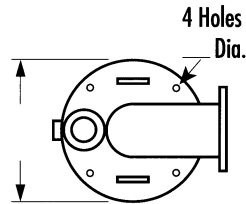
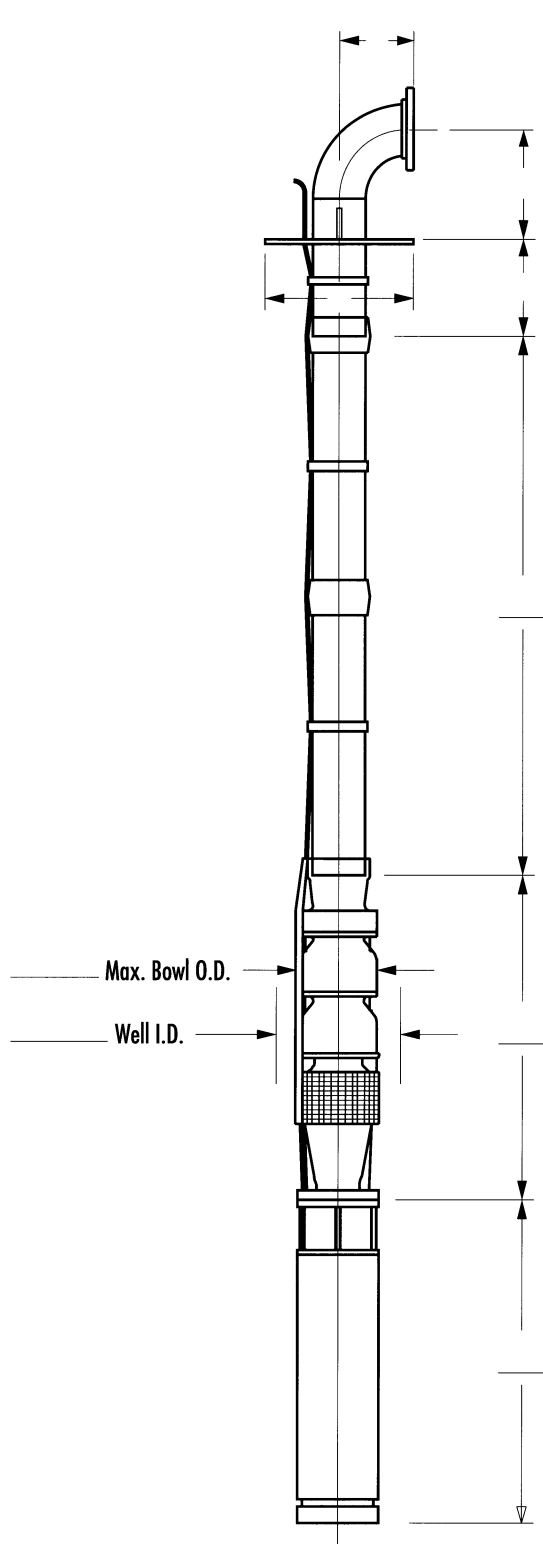
Model \_\_\_\_\_

Motor H.P. \_\_\_\_\_



**ENGINEERING data**  
**DISCHARGE ELBOWS**

**SUBMERSIBLE MOTOR DRIVE FABRICATED  
ABOVE SURFACE DISCHARGE ELBOW - 150# FLANGE**



Discharge Elbow - 150# Flange

**NOTES:**

1. All dimensions in inches.
2. Component dimensions may vary  $\pm 1/8"$
3. Not for construction purposes unless certified.
4. The minimum opening must be greater than the largest component dimension. That may be the motor, the column pipe, or the combination bowl diameter and cable guard.
5. The well-to-bowl assembly selection will have to include room for passage of the power cable guard along the bowl assembly length. For purposes of making this allowance, refer to the O.D. of the proposed bowl unit and add to this the dimension shown opposite the motor proposed:
  - 6" motor - 3/4"
  - 8" motor - 1"
  - 10" motor - 1"
  - 12" motor - 1"
  - 14' motor - 2"

It may be possible to lessen these dimensions slightly. Check with the factory if this is necessary.

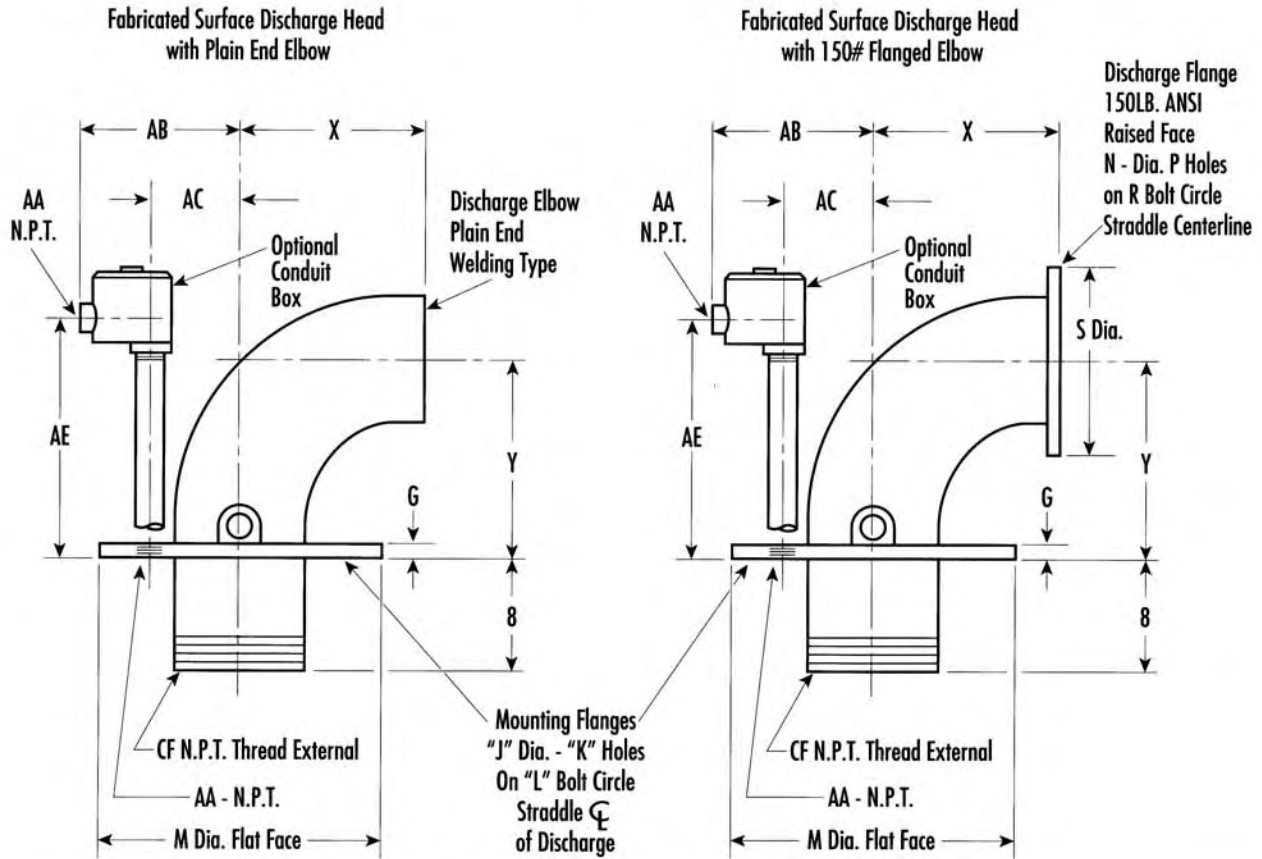
Model \_\_\_\_\_

Motor H.P. \_\_\_\_\_



**ENGINEERING data**  
**DISCHARGE ELBOWS**

**ABOVE SURFACE DISCHARGE ELBOW DIMENSIONS**



**Fabricated**

Well Size & Disch. (I.D.)	Column Size	G		J	K		L	M	N	P	R	S	X		Y	AA	AB	AC	AE	CF
		Std.	150#		Std.	150#							Std.	150#						
8	3	3/4	1-1/8	7/8	4	8	11-3/4	13-1/2	3/4	4	6	7-1/2	4-1/2	5	7	1-1/2	8	3-1/4	10-1/4	3
	4	3/4	1-1/8	7/8	4	8	11-3/4	13-1/2	3/4	8	7-1/2	9	6	6-1/2	8	1-1/2	9	3-3/4	11-1/2	4
	5	3/4	1-1/8	7/8	4	8	11-3/4	13-1/2	7/8	8	8-1/2	10	7-1/2	8	9	1-1/2	9	3-3/4	11-1/2	5
10	4	1	1-3/16	1	4	12	14-1/4	16	3/4	8	7-1/2	9	6	6-1/2	8	1-1/2	9	3-3/4	12	4
	5	1	1-3/16	1	4	12	14-1/4	16	7/8	8	8-1/2	10	7-1/2	8	9	1-1/2	9-1/2	4-1/4	12-1/2	5
	6	1	1-3/16	1	4	12	14-1/4	16	7/8	8	9-1/2	11	9	9-1/2	12	1-1/2	9-1/2	4-1/4	15-1/2	6
12	5	1	1-1/4	1	4	12	17	19	7/8	8	8-1/2	10	7-1/2	8	9	2	9-1/2	4-1/2	12-1/2	5
	6	1	1-1/4	1	4	12	17	19	7/8	8	9-1/2	11	9	9-1/2	12	2	10	5	15-1/4	6
	8	1	1-1/4	1	4	12	17	19	7/8	8	11-3/4	13-1/2	12	12-1/2	15	2	10-1/2	5-1/2	18	8
14	8	1	1-3/8	1-1/8	4	12	18-3/4	21	7/8	8	11-3/4	13-1/2	12	12-1/2	15	2	11	6	18	8
16	10	1-1/4	1-7/16	1-1/8	4	16	21-1/4	23-1/2	1	12	14-1/4	16	15	15-1/2	18	2-1/2	11	7	19-1/4	10
18	10	1-1/4	1-9/16	1-1/4	4	16	22-3/4	25	1	12	14-1/4	16	15	15-1/2	18	2-1/2	11-1/2	7-1/2	19-1/4	10
	12	1-1/4	1-9/16	1-1/4	4	16	22-3/4	25	1	12	17	19	18	18-1/2	22	2-1/2	11-1/2	7-1/2	20-3/4	12
20	14	1-1/4	1-11/16	1-1/4	4	20	25	27-1/2	1-1/8	12	18-3/4	21	21	21-1/2	25	2-1/2	12-1/4	8-1/4	22-1/4	14

**NOTES:**

1. All dimensions in inches.
2. Component dimension may vary  $\pm 1/8$ .
3. Not for construction purposes unless certified.

