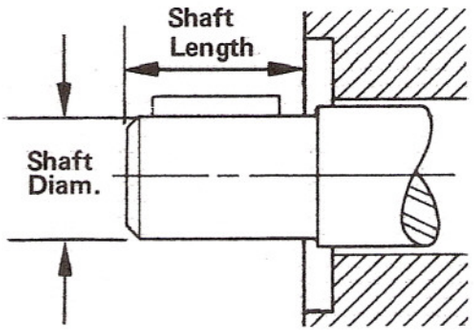
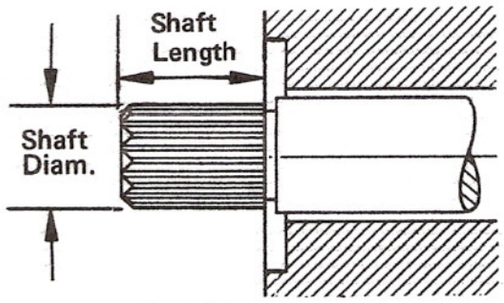
STRAIGHT SHAFT WITHOUT THREAD

Shaft Ident. Code	Shaft Diam.	Short Shaft Lgth.	Long Shaft Lgth.	Key Width
13-1	1/2	.750	- - - -	.125
16-1	5/8	.938	2.000	.156
22-1	7/8	1.312	2.500	.250
25-1	1	1.500	2.750	.250
32-1	1¼	1.875	3.000	.312
38-1	1½	2.125	3.250	.375
44-1	1¾	2.625	3.625	.437



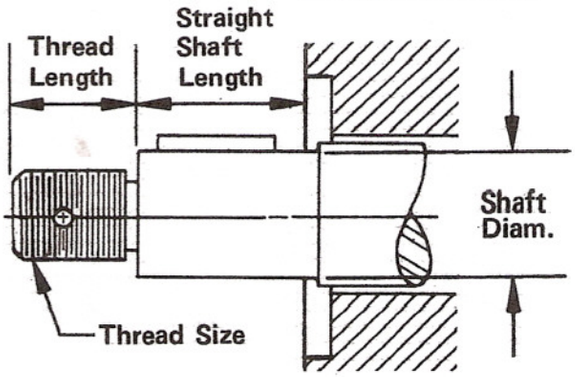
30-DEGREE INVOLUTE SPLINE

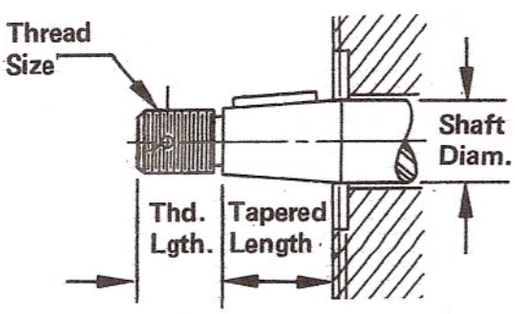
Shaft Code	Shaft Diam.	Shaft Lgth.	Spline Specs.
13-4	1/2	.750	9T, 20/40 DP
16-4	5/8	.938	9T, 16/32 DP
22-4	7/8	1.312	13T, 16/32 DP
25-4	1	1.500	15T, 16/32 DP
32-4	1¼	1.875	14T, 12/24 DP
38-4	1½	2.125	17T, 12/24 DP
44-4	1¾	2.625	13T, 8/16 DP
50-4	2	3.125	15T, 8/16 DP



STRAIGHT SHAFT WITH THREAD

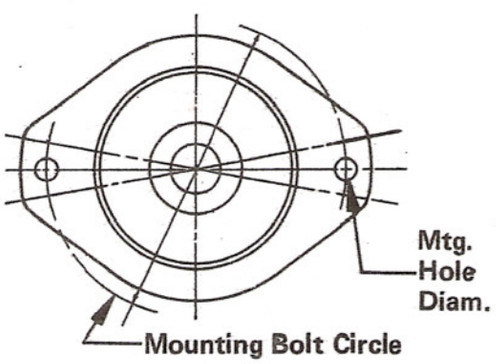
Shaft Ident.	Shaft Diam.	Str. Shaft	Thd. Size	Thd. Lgth.	Key Width
13-2	1/2	.750	3/8-24	.562	.125
16-2	5/8	.938	1/2-20	.719	.156
22-2	7/8	1.312	5/8-18	.906	.250
25-2	1	1.500	3/4-16	1.062	.250
32-2	1¼	1.875	1-12	1.219	.312
38-2	1½	2.125	1-1/8-12	1.375	.375
44-2	1¾	2.625	1-1/4-12	1.562	.437





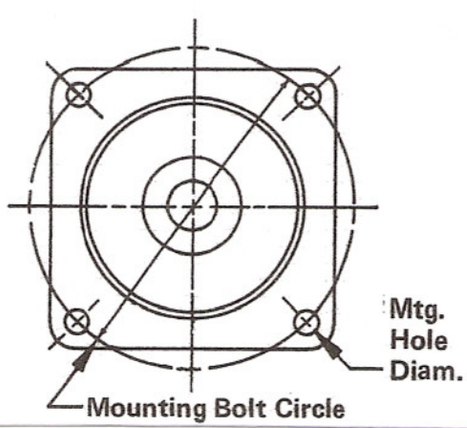
NFPA STANDARD TAPERED SHAFTS WITH THREADS

Shaft Ident. Code	Shaft Diam.	Tprd Shaft Lgth.	Thd'd Shaft Lgth.	Thd. Size	Key Width
13-3	1/2	.688	.500	5/16-32	.125
16-3	5/8	.688	.719	1/2-20	.156
22-3	7/8	1.125	.906	5/8-18	.250
25-3	1	1.375	1.062	3/4-16	.250
32-3	1¼	1.375	1.219	1-12	.312
38-3	1½	1.875	1.375	1-1/8-12	.375
44-3	1¾	2.125	1.562	1-1/4-12	.437
50-3	2	2.875	1.562	1-1/4-12	.500



NFPA STANDARD TWO-BOLT MOUNTING FLANGES

Flange Code	SAE No.	SAE HP Rating	M'tg. Bolt Circle	M'tg. Bolt Dia.	Pilot Dia.	Pilot Hgt.
50-2	- - -	- - -	3.250	.406	2.00	.250
82-2	A	10	4.188	.438	3.25	.250
101-2	B	25	5.750	.562	4.00	.380
127-2	C	50	7.125	.688	5.00	.500
152-2	D	100	9.000	.812	6.00	.500
165-2	E	200	12.50	1.062	6.50	.625
177-2	F	300	13.78	1.062	7.00	.625



NFPA STANDARD FOUR-BOLT MOUNTING FLANGES

Flange Code	SAE No.	SAE HP Rating	M'tg Bolt Circle	M'tg. Bolt Dia.	Pilot Dia.	Pilot Hgt.
101-4	B	25	5.000	.562	4.00	.380
127-4	C	50	6.375	.562	5.00	.500
152-4	D	100	9.000	.812	6.00	.500
165-4	E	200	12.50	.812	6.50	.625
177-4	F	300	13.78	1.062	7.00	.625

j. Matching the GPM of a Broken Gear Pump. When purchasing a replacement for a worn out or damaged gear pump, sometimes an exact replacement pump is unavailable and it is necessary to purchase a pump of a different brand. If the GPM rating of the old pump is not known, use this chart to estimate it, then purchase the new pump as close to this rating as possible. It is important to match the old pump in flow rating. If the new pump has less flow, the system will operate at a slower speed than before. If more flow, the driving motor or engine may not have sufficient horsepower to drive it to full pressure.

Figures in the body of this chart are GPM displacements (approximate) of a gear pump running at 1200 RPM and 0 PSI.

Gear Thickness	Pitch Diameter of Gear 1-1/2"	2" PD	3" PD	3-5/8"
5/8"	3.9			
3/4	4.6	8.01	GPM FLOW AT 1200 RPM	
7/8	5.4	9.39		
1	6.2	10.7	19.0	
1-1/4	7.8	13.4	23.8	50
1-1/2	9.4	16.0	28.5	60
1-3/4	11.0	18.7	33.3	70
2	12.6	23.4	38.0	80
2-1/4		24.0	42.8	90
2-1/2		26.7	47.5	100
2-3/4		29.4	52.3	110
3		32.0	57.0	120
3-1/4			61.8	130
3-1/2			66.5	140
3-3/4				150
4				160

To use the chart, measure the thickness and pitch diameter of the gears in the old pump. Pitch diameter is found by measuring separation between the two gear shafts, not by measuring outside diameter of the gears.

Use pitch diameter and gear thickness to find GPM rating of the old pump at 1200 RPM. Select the replacement pump with rating as close to this as possible. When studying specifications of new pumps be sure to use the ratings at 1200 RPM.

For estimating pitch diameters not shown in this chart, notice that when the pitch diameter doubles, the GPM displacement increases approximately 3 times.

RULE-OF-THUMB FOR ESTIMATING HORSEPOWER

Rule-of-Thumb: 1 HP input is required for each 1 GPM at 1500 PSI

This rule is simple and easy to remember, and is handy for rough estimating to determine the horsepower rating of an engine or motor for driving a hydraulic pump.

For example, a 5 GPM pump operating at 1500 PSI would need 5 HP, or at 3000 PSI would need 10 HP. A 10 GPM pump at 1000 PSI would need 6-2/3 HP, or the same pump operating at 1500 PSI would need 10 HP, etc.

Another handy rule-of-thumb is that it takes about 5% of the full rated horsepower to idle a pump when it is "unloaded", that is, when it is re-circulating oil at near zero pressure. This amount of power is needed to take care of flow losses through the pump plus mechanical friction losses in the bearings and pumping elements.

TABLE 5-A. INPUT HORSEPOWER FOR A HYDRAULIC PUMP

Figures in the body of the chart show the horsepower needed at the PSI and GPM shown. (Pump efficiency is assumed to be 85%).

GPM	500 PSI	750 PSI	1000 PSI	1250 PSI	1500 PSI	1750 PSI	2000 PSI	2500 PSI	3000 PSI	5000 PSI
3	1.03	1.54	2.06	2.57	3.09	3.60	4.12	5.15	6.18	10.3
5	1.72	2.57	3.43	4.29	5.15	6.00	6.86	8.58	10.3	17.2
8	2.75	4.12	5.49	6.86	8.24	9.61	11.0	13.7	16.5	27.5
10	3.43	5.15	6.86	8.58	10.3	12.0	13.7	17.2	20.6	34.3
12	4.12	6.18	8.24	10.3	12.4	14.4	16.5	20.6	24.7	41.2
15	5.15	7.72	10.3	12.9	15.4	18.0	20.6	25.7	30.9	51.5
20	6.86	10.3	13.7	17.2	20.6	24.0	27.5	34.3	41.2	68.6
25	8.58	12.9	17.2	21.4	25.7	30.0	34.3	42.9	51.5	85.8
30	10.3	15.4	20.6	25.7	30.9	36.0	41.2	51.5	61.8	103
40	13.7	20.6	27.5	34.3	41.2	48.0	54.9	68.6	82.4	137
50	17.2	25.7	34.3	42.9	51.5	60.0	68.6	85.8	103	172
60	20.6	30.9	41.2	51.5	61.8	72.1	82.4	103	124	206
70	24.0	36.0	48.0	60.0	72.1	84.1	96.1	120	144	240
80	27.5	41.2	54.9	68.6	82.4	96.1	110	137	165	275
100	34.3	51.5	68.6	85.8	103	120	137	172	206	343