

## 2. Modelos de Bombas

BOMBAS		PRESIÓN PSI													
MAX PPM	MOD. N°.	0		45		87		175		225		450		780	
		GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP
1400	2M1	0.64	0.50	0.62	0.50	0.58	0.50	***.54	0.50	-	-	-	-	-	-
1400	3M1	0.64	0.50	0.63	0.50	0.61	0.50	****.54	0.50	-	-	-	-	-	-
1400	6M1	0.64	0.75	0.63	0.75	0.63	0.75	0.61	0.75	0.59	0.75	****.54	0.75	-	-
1375	1L2	3.30	0.50	3.00	0.50	2.30	0.50	-	-	-	-	-	-	-	-
1375	2L2	3.30	0.75	3.20	0.75	3.00	0.75	2.30	0.75	-	-	-	-	-	-
1375	3L2	3.30	0.75	3.20	0.75	3.10	0.75	2.80	0.75	2.50	0.75	-	-	-	-
1375	6M2	3.30	1.50	3.30	1.50	3.30	1.50	3.10	1.50	3.10	1.50	2.50	1.50	-	-
1375	9P2	3.30	2.50	3.30	2.50	3.30	2.50	3.20	2.50	3.20	2.50	2.90	2.50	2.30	2.50
1200	1L3	9.60	1.00	8.80	1.00	7.00	1.00	-	-	-	-	-	-	-	-
1200	2L3	9.60	1.50	9.30	1.50	8.80	1.50	7.00	2.00	-	-	-	-	-	-
1200	3L3	9.60	2.00	9.50	2.00	9.20	2.00	8.30	2.00	7.60	3.00	-	-	-	-
1200	6M3	9.60	5.00	9.50	5.00	9.50	5.00	9.20	5.00	9.00	5.00	7.60	5.00	-	-
1200	9P3	9.60	7.50	9.60	7.50	9.50	7.50	9.40	7.50	9.30	7.50	8.60	7.50	7.00	7.50
1050	1L4	21.00	1.50	18.30	1.50	12.50	2.00	-	-	-	-	-	-	-	-
1050	2L4	21.00	2.00	20.10	2.00	18.40	2.00	12.50	5.00	-	-	-	-	-	-
1050	3L4	21.00	2.50	20.60	2.50	19.70	2.50	16.70	5.00	14.40	5.00	-	-	-	-
1050	6M4	21.00	5.00	20.80	5.00	20.60	5.00	19.70	5.00	19.00	5.00	14.40	7.50	-	-
1050	9P4	21.00	10.00	20.90	10.00	20.80	10.00	20.30	10.00	20.00	10.00	17.70	10.00	12.60	15.00
925	1L6	46.00	3.00	42.50	3.00	35.10	5.00	-	-	-	-	-	-	-	-
925	2L6	46.00	5.00	44.90	5.00	42.70	5.00	35.00	7.50	-	-	-	-	-	-
925	3L6	46.00	7.50	45.40	7.50	44.30	7.50	40.50	7.50	37.60	10.00	-	-	-	-
925	6M6	46.00	15.00	45.80	15.00	45.50	15.00	44.30	15.00	43.40	15.00	37.60	20.00	-	-
925	9P6	46.00	15.00	45.90	15.00	45.70	15.00	45.20	15.00	44.70	15.00	41.80	20.00	35.20	30.00
800	1L8	86.00	5.00	80.00	5.00	69.00	7.50	-	-	-	-	-	-	-	-
800	2L8	86.00	7.50	84.00	7.50	81.00	10.00	69.00	15.00	-	-	-	-	-	-
800	3L8	86.00	10.00	85.00	10.00	83.00	10.00	77.00	15.00	73.00	20.00	-	-	-	-
800	5M8	86.00	15.00	85.00	15.00	85.00	15.00	82.00	15.00	80.00	20.00	**69	30.00	-	-
800	9P8	86.00	30.00	85.00	30.00	85.00	30.00	84.00	30.00	84.00	30.00	79.00	40.00	69.00	50.00
750	1L10	146.00	5.00	136.00	7.50	128.00	10.00	-	-	-	-	-	-	-	-
750	2L10	146.00	10.00	142.00	10.00	134.00	10.00	98.00	15.00	-	-	-	-	-	-
750	3L10	146.00	15.00	143.00	15.00	139.00	15.00	127.00	20.00	115.00	20.00	-	-	-	-
750	6M10	146.00	30.00	144.00	30.00	142.00	30.00	138.00	30.00	134.00	30.00	115.00	40.00	-	-
750	9P10	146.00	50.00	145.00	50.00	143.00	50.00	142.00	50.00	140.00	50.00	130.00	50.00	102.00	75.00
700	1L10H	190.00	7.50	178.00	7.50	156.00	15.00	-	-	-	-	-	-	-	-
700	2L10H	190.00	15.00	185.00	15.00	180.00	15.00	165.00	20.00	-	-	-	-	-	-
700	4M10H	190.00	30.00	189.00	30.00	187.00	30.00	182.00	30.00	178.00	40.00	*170	40.00	-	-
650	1L12	275.00	15.00	260.00	15.00	210.00	20.00	-	-	-	-	-	-	-	-
650	2L12	275.00	25.00	270.00	25.00	260.00	20.00	215.00	30.00	-	-	-	-	-	-
650	3L12	275.00	30.00	272.00	30.00	268.00	30.00	251.00	40.00	230.00	40.00	-	-	-	-
600	1L12H	382.00	20.00	362.00	20.00	282.00	25.00	-	-	-	-	-	-	-	-
600	2L12H	382.00	30.00	375.00	30.00	362.00	30.00	282.00	40.00	-	-	-	-	-	-

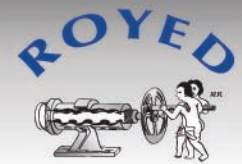
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## 2. Modelos de Bombas

### 3 L 3 – C D Q

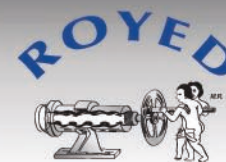
3	L	3
NUMERO DE ETAPAS	TAMAÑO DE EXT. MOTRIZ	TAMAÑO DEL ELEMENTO
C	D	Q
MATERIAL DEL HOUSING	MATERIAL DE LAS PARTES INT.	MATERIAL DEL ESTATOR

	STANDAR MATERIALS	SPECIAL MATERIALS
PUMP BODY INCLUDING ROTOR	C, CAST IRON S, 316 STAINLESS STEEL	CARPENDEL 20 HASTELLOY*, MONEL*
INTERNALS, INCLUDING ROTOR	D, ALLOY STEEL S, 316 STAINLESS STEEL	CARPETER 20 HASTELLOY*, MONEL
STATOR	B, EPDM (TO 260F) F, FLUOROELASTOMER (TO 425F) Q, NITRILE (TO 210F) R, NATURAL RUBBER (TO 185F)	VITON,* THIOKOL HYPALON,* TEFLÓN WHITE NITRILE, URETANE ALLOY STEEL, 416 SS

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## 2. Modelos de Bombas

### 2.1 Datos de desempeño de las bombas de cavidad progresiva.

Los datos de desempeño tabulados en la hoja 4, son para bombas tipo “L, M, P” con succión brindada estándar y estatores de durómetro tipo 70, que bombean agua limpia a 68° f. Los datos de desempeño son solo como una guía general de selección, la selección final de la bomba deberá ser basada en datos proporcionados en curvas de desempeño publicadas.

La “L” en el tamaño del marco indica una relación estándar entre los elementos de bombeo y el extremo motriz (housing) baleros y flecha motriz, muchas variaciones se pueden hacer adaptando tamaño mas chicos de elementos aun extremo motriz mas largo. Esto pudiera ser necesario debido a la severidad de una aplicación específica de bombeo.

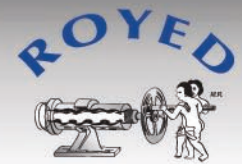
En casos donde el extremo motriz es un tamaño más grande que el tamaño del elemento normalmente usado, se le llama bomba tipo marco “M”, por ejemplo ( 3 m 4 ). Si el extremo motriz es 2 tamaños más grande que el tamaño del elemento se le llama a la bomba de marco tipo “P”, así un marco 3L6, 3M4 y 3P3, usarían todos un extremo motriz común.

Como guía para seleccionar una bomba de servicio de fluidos diferentes al agua tales como aplicaciones de otra abrasión y alta viscosidad refiérase a las guías de selección que se encuentra en las siguientes páginas de este boletín, o contáctenos para que lo ayudemos a seleccionar una bomba.

Nota: lodos de alta viscosidad o cualquier material excepto sustancias parecidas al agua requieren un incrementador de caballaje, lo cual puede hacer necesario que se incremente el tamaño del extremo motriz.

### 2.2 Consideraciones para la selección.

El proceso básico involucra determinar el tamaño del elemento y requerido para cumplir con las condiciones de flujo específico, y de acuerdo a ellos seleccionar el tamaño del extremo motriz que cumpla con los requerimientos de caballaje.



## 2. Modelos de Bombas

### 2.3 ¿Cómo seleccionar una bomba?

El seguimiento es el procedimiento sugerido para seleccionar una bomba de cavidad progresiva tipo "L".

El uso de este procedimiento le proporcionara una indicación general para seleccionar la mejor bomba para sus necesidades. Las bombas de cavidad progresiva se identifican por el número de modelo y consiste en dos caracteres por ejemplo:

3 Una etapa es un juego completo de líneas de sellado, las líneas de sellado creadas por el rotor en contacto con el estator dan a las bombas de cavidad progresiva su resistencia a la presión de descarga.

Si se incluyen mas líneas de sellado en el elemento la resistencia a la presión se incrementa, por lo tanto si se incluyen mas etapas en los elementos, la bomba será capaz de mantener su capacidad a una presión mayor.

Segundo carácter "L" es una letra que representa el tamaño del extremo motriz, el cual se selecciona en base de los requerimientos.

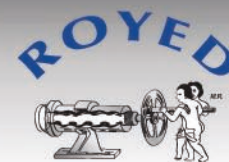
El tercer carácter en un número que representa el tamaño del rotor y estator que son elementos de bombeo. Estos definen la capacidad de la bomba siendo 1 la capacidad menor y 12H la capacidad mayor.

### 2.4 ¿Cómo determinar la velocidad de operación?

Usando la tabla 3 de selección, la velocidad apropiada con respecto a las características abrasivas del material que se va a bombear.

### 2.5 Determining number of stages.

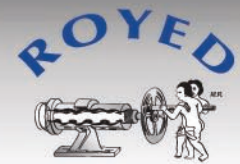
Determine the approximate number of stages required by dividing the maximum differential pressure by the maximum recommended pressure per stage as shown in table 4.



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TABLA 1. TAMAÑO DEL ELEMENTO

		VISCOSIDAD										
TAMAÑO DEL ELEMENTO		1	500	1,000	2,000	3,000	5,000	10,000	20,000	30,000	50,000	100,000
1	MAX RPM	1400	1400	1400	1400	1400	950	500	250	175	100	50
	MAX GPM	0.64	0.51	0.45	0.38	0.33	0.22	0.12	0.06	0.04	0.02	0.01
2	MAX RPM	1375	1375	1375	1375	1375	950	500	250	175	100	50
	MAX GPM	3.3	2.6	2.3	2.0	1.7	1.2	0.6	0.31	0.21	0.13	0.06
3	MAX RPM	1200	1200	1200	1200	1200	950	500	250	175	100	50
	MAX GPM	9.6	7.9	7.0	6.0	5.3	3.9	2.0	1.0	0.71	0.42	0.21
4	MAX RPM	1050	1050	1050	1050	1050	950	500	250	175	100	50
	MAX GPM	21.0	17.7	15.8	13.6	12.1	9.7	5.1	2.6	1.8	1.1	0.52
6	MAX RPM	925	925	925	925	925	925	500	250	175	100	50
	MAX GPM	46.0	39.6	35.7	30.8	27.6	23.6	12.6	6.4	4.4	2.6	1.3
8	MAX RPM	800	800	800	800	800	800	500	250	175	100	50
	MAX GPM	85.6	75.3	68.5	59.6	53.8	46.3	27.1	13.8	9.5	5.6	2.8
10	MAX RPM	750	750	750	750	750	750	500	250	175	100	50
	MAX GPM	137.3	115.3	107.1	94.7	86.5	76.9	47.1	24.3	17.0	10.1	5.2
10H	MAX RPM	700	700	700	700	700	700	500	250	175	100	50
	MAX GPM	189.7	163.1	148	132.8	121.4	108.1	70.5	35.2	25.1	14.9	7.6
12	MAX RPM	650	650	650	650	650	650	500	250	175	100	50
	MAX GPM	275.6	239.8	220.5	192.9	179.1	159.8	110.2	56.2	38.6	23.3	12.1
12H	MAX RPM	600	600	600	600	600	600	500	250	175	100	50
	MAX GPM	381.6	335.8	305.3	274.8	255.7	229	165.4	84.3	57.9	35	18.1



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Example the required differential pressure of the example is 454 PSI. Table 4 indicates that, for light abrasion, the maximum recommended pressure per stage is 65.25 PSI. since the required pressure is 45.PSI single stage elements are required.

TABLA 2. TAMAÑO MAXIMO DE PARTICULAS

<b>DIÁMETRO DE LOS ELEMENTOS DE LA BOMBA</b>										
	1	2	3	4	5	6	10	10H	12	12H
TAMAÑO MAXIMO DE PARTICULAS PULGADA	0.08	0.15	0.2	0.3	0.4	0.6	0.8	0.8	1.00	1.00

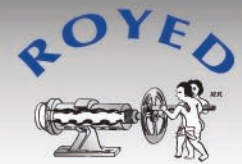
### 2.6 Determining pump model

Having determined the pump elements size and the number of stages required refer to the performance table on page 4 to determine the drive end to be used with the elements.

TABLA 3. SUGGESTING MAXIMUM PUMP SPEED FOR ABRASIVE FLUIDS

<b>ABRASIVE CHARACTERISTICS</b>					
SIZE PUPING ELEMENT		NADA	LIGERO	MEDIO	GRUESO
1	MAX RPM	1400	1050	700	350
	MAX GPM	0.63	0.47	0.32	0.16
2	MAX RPM	1375	1025	675	325
	MAX GPM	3.2	2.44	1.61	0.77
3	MAX RPM	1200	900	600	300
	MAX GPM	9.6	7.18	4.79	2.39
4	MAX RPM	1050	775	525	250
	MAX GPM	21	15.5	10.5	4.99
6	MAX RPM	925	675	450	225
	MAX GPM	46	33.6	22.4	11.2
8	MAX RPM	800	600	400	200
	MAX GPM	86	64.2	42.8	21.4
10	MAX RPM	750	550	375	175
	MAX GPM	146	100.7	68.6	32
10H	MAX RPM	700	525	350	175
	MAX GPM	190	142.3	94.9	47.4
12	MAX RPM	650	475	325	150
	MAX GPM	275	201.4	137.8	63.6
12H	MAX RPM	600	450	300	150
	MAX GPM	382	286.2	190.8	95.4

Example- it has been determined that the single stage #6 elements are required for the example application. A review of the performance tables indicates the pump model would be a 1L6. it was previously determined that the pump would have to operate at approximately 500 RPM to produce the desired flow rate of 15 GPM.



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The performance tables can be used to determine the approximate HP required at 500 RPM and 45 PSI (Since the HP values in the performance table have been rounded to the next higher integral motor size, exact interpolation is not necessary).

Review of the performance data indicates that a 1L6 pump operating at 925 RPM and 45 PSI has a HP requirement of 3. at the lower speed of 500 RPM the HP requirement would be 1.6 HP. This is the approximate HP required to pump water. For more viscous fluids or fluids with solids, the total HP required would be a combination of the water HP and a viscous HP adder or solids HP adder.

TABLA 4. RECOMMENDED MAXIMUM PRESSURES PER STAGE FOR ELASTOMERIC STATORS

<b>Q, F, B ESTADORES</b>	<b>CARACTERISTICAS ABRASIVAS</b>			
TAMAÑO DE LEMENTOS				
1	58	43.5	29	14.5
12H	87	65.25	43.5	21.75

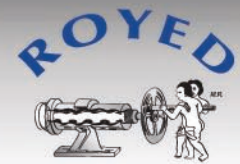
  

<b>R ESTADORES</b>	<b>CARACTERISTICAS ABRASIVAS</b>			
TAMAÑO DE ELEMENTOS BOMBEADOS	NADA	LIGERO	MEDIO	DURO
1	38.7	29	19.3	9.7
12H	58	43.5	29	14.5

### 2.7 Viscosity hp adder

Table 5 provides the HP adders for viscosity (per stage per 100 RPM) for each element size. For the particular element size used, multiply the appropriate adder times the number of stages times the RPM, divided by 100. the result will be the viscosity HP adder to be added to the water HP derived from the performance data or curves.

Example- table 5 indicates the HP adder per stage per 100RPM for a #6 element to be .1625 for a 2500 cps fluid and .2250 for a 5000 cps fluid. For a 3000 cps fluid it is necessary to interpolate between the two values to obtain the viscosity adder for 3000 cps. When this is done a value of



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175 HP per stage per 100 RPM obtained. This value should be multiplied by the number of stages (1) and the RPM (500) divided by 100. the resultant HP adder would be .875 HP. This value should be added to the water HP requirement of 1.6 HP for a total HP requirement of 2.5 HP.

The final pump selection for this application would be a 1L6 operating at 500 RPM with a driver HP requirement of 2.5 HP.

TABLE 5. HP ADDERS/STAGE/100RPM

VISCOSIDAD							
TAMAÑO	1	2,500	5,000	10,000	50,000	100,000	150,000
1	0	0.0017	0.0024	0.0032	0.0069	0.0095	0.0115
2	0	0.0882	0.0115	0.0155	0.0315	0.0450	0.0550
3	0	0.0290	0.0399	0.0520	0.1100	0.1500	0.1800
4	0	0.0650	0.0900	0.1225	0.2550	0.3500	0.4200
6	0	0.1625	0.2250	0.3000	0.6400	0.8800	1.0500
8	0	0.3700	0.5100	0.7000	1.5000	2.0000	2.4500
10	0	0.5950	0.8200	1.1250	2.3500	3.2000	3.9000
10H	0	0.8000	1.2000	1.7000	2.5000	4.8000	5.9000
12	0	1.1000	1.9000	2.6000	5.4000	7.4000	9.0000
12H	0	2.1000	2.9000	4.0000	8.2000	11.5000	14.0000

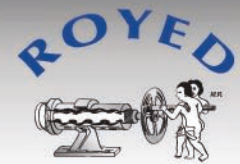
### 2.8 Temperature multiplier

Published performance data (page 4) are for water at 68° f. Higher fluid temperatures may require increasing drive horsepower and /or decreasing rotor size. For applications which involve temperatures in excess of 68° f, table 6 provides multipliers required for standard size and undersize rotors. Multiply the minimum horsepower (page 4), as corrected in step 6 for viscosity, by the multiplier for the appropriate rotor size and fluid temperature.

TABLE 6. TEMPERATURE MULTIPLIERS

ESTATOR	Q, R	68 F	100 F	125 F	150 F	175 F	200 F
MATERIAL	F	68 F	108 F	140 F	170 F	200 F	232 F
	F	68 F	130 F	180 F	230 F	285 F	330 F
ESTÁNDAR SIZE ROTOR		1.00	1.10	1.30	1.60	2.00	2.50
UNDERSIZE ROTOR		0.75	0.80	0.85	0.95	1.10	1.60





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### 2.9 Additional considerations

Solids content and suction conditions can have an effect on the requirements. Solids-Fluids containing solids may require an adjustment to HP, as with the viscosity HP adder.

Suction conditions-Published performance data assume flooded suction conditions. For high suction lift applications, or for applications involving viscous fluids and net positive suction heads available at the pump that differ significantly from atmospheric pressure (14.7 PSI), it may be necessary to adjust the performance of the pump to compensate for these factors.

Progressing Cavity Pumps L, j and JS pumps are pumps are available as complete pump/drive units, mounted on base plates and ready to install. Four typical configurations are shown below. Baseplates may be provided with drain rims, drip pans, grout holes, anchor bolts or other options as required by the individual installation.

Typical drive options include: mechanical variable speed drives  
Electronic AC or DC drives  
Hydraulic drives  
Standard AC or DC motors  
Gear motors  
Eddy current drives.

Almost any type of coupling, V-belt, cog-type belt, or chain –and –sprocket drive can be provided to meet specific customer requirements.

#### *Other options include:*

Mechanical seals  
Motor controls  
Tachometers  
Water-flush systems  
Special packings  
Gauge packages  
Anti-rotation devices  
Jacketing for pumps handling materials that must be kept hot or chilled.