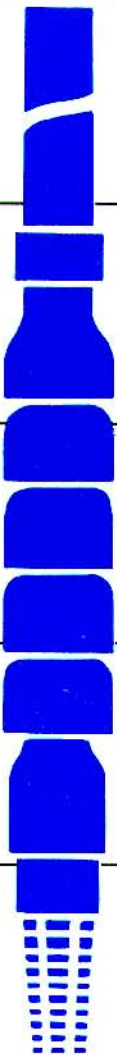
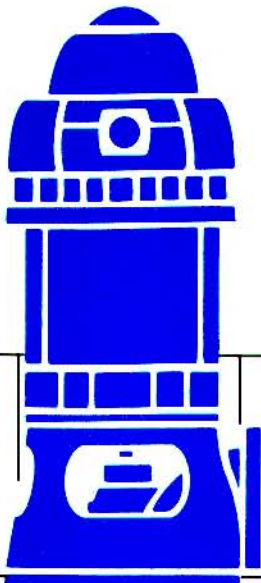


Peerless Pump

VERTICAL LINESHAFT TURBINE PUMPS

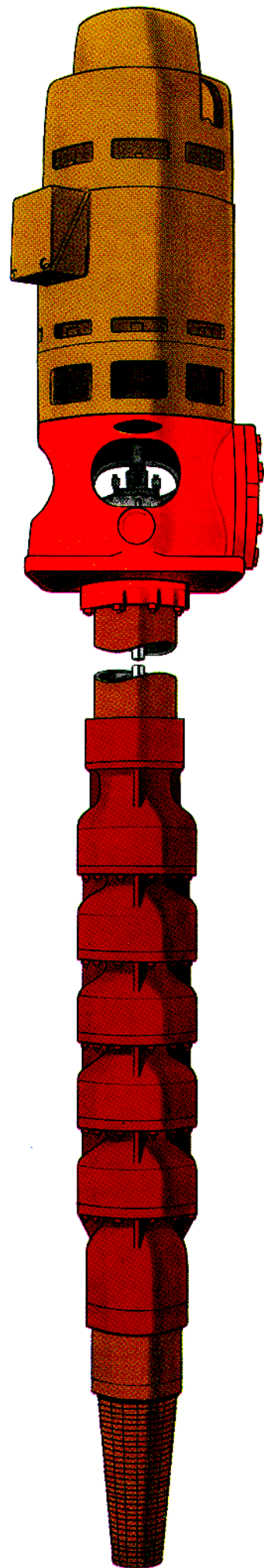


We invite you to look over the many features of design and construction outlined in the following pages and then compare Peerless with any other vertical lineshaft pump.

Peerless Pump materials, manufacturing methods, workmanship and inspection techniques are modern and assure high quality in every Peerless pump.

Look to Peerless for quality assurance in your pump.

PEERLESS® pump



PEERLESS VERTICAL LINESHAFT TURBINE PUMP CHARACTERISTICS

- CAPACITIES:** to 100,000 gpm
- HEADS:** to 2,500 feet
- SETTINGS:** to 1,500 feet
- HORSEPOWER:** to 5,000 hp
- TYPES:** Water-lubricated or oil-lubricated
- DRIVES:** Electric, right angle gear, combination motor-gear, engine, or steam turbine drives can be furnished.

NOTICE

Materials of construction, specifications, dimensions, design features, and application information, where shown in this bulletin, are subject to change and/or modification without notice by Peerless Pump at their option.

LOOK TO PEERLESS PUMP BEFORE YOU SELECT YOUR VERTICAL LINESHAFT TURBINE PUMP

Consider all the important factors before selecting your next pump

QUALITY ASSURANCE – High standards in the manufacture of each Peerless pump are your assurance of quality.

ECONOMY – Peerless welcomes comparison of price on basis of amortization on five year, ten year and longer periods. The most economical pump is the one which gives maximum *sustained* efficiency day after day, year after year. (See page 14 for method of figuring true pump costs.)

REPUTATION – Peerless is one of the leading manufacturers of deep well vertical lineshaft turbine pumps. This reputation has been built on the basis of product quality, superior service and dependable, long-lived performance.

DESIGN – Half a century of engineering experience and know-how in the design of vertical turbine pumping equipment of all types are your assurance of the modern features in your new Peerless pump.

MANUFACTURING – Each step in the manufacture of Peerless vertical lineshaft pumps is carefully controlled, from Peerless' own foundries to final inspection and assembly, crating and shipping. Specifications for Peerless materials, components and fits are firm, exacting and rigidly enforced.

FACILITIES—Peerless Pump offers worldwide coverage with manufacturing, sales and service facilities. Factory-trained distributors, dealers and sales engineers are conveniently located throughout the U.S.A. and the world. Convenient location of facilities, district and branch offices assures quick, effective communication with your nearest Peerless pump representative.

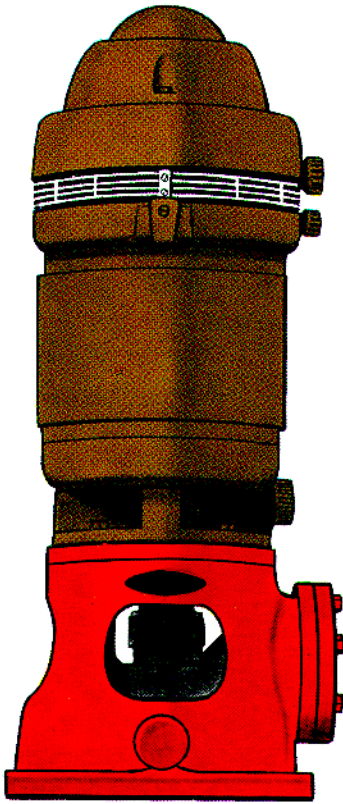
EFFICIENCY – Mechanical and hydraulic design features are combined to provide high efficiency, peak performance and lower pumping costs.

CONSULTATION—Engineering-trained Peerless pump personnel are available to assist you with your pump selection. Qualified counsel on all your pumping problems is available on request.

RESPONSIBILITY – In addition to quality of product, premium performance, and service before and after sale, Peerless Pump offers a degree of responsibility to customers unmatched by most other manufacturers. Peerless Pump assures you undivided responsibility in all its transactions.

GUARANTEE – Each Peerless vertical lineshaft turbine pump is guaranteed against defects in materials and workmanship for one year. We are confident that these are excellent pumps, and we invite your comparison.

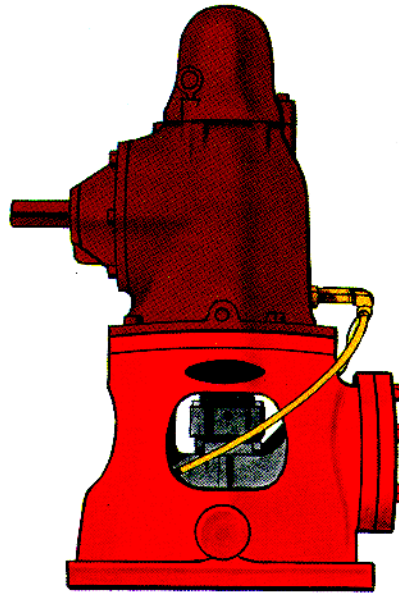
TOP PERFORMANCE FROM EACH TYPE DRIVE



ELECTRIC MOTOR DRIVE

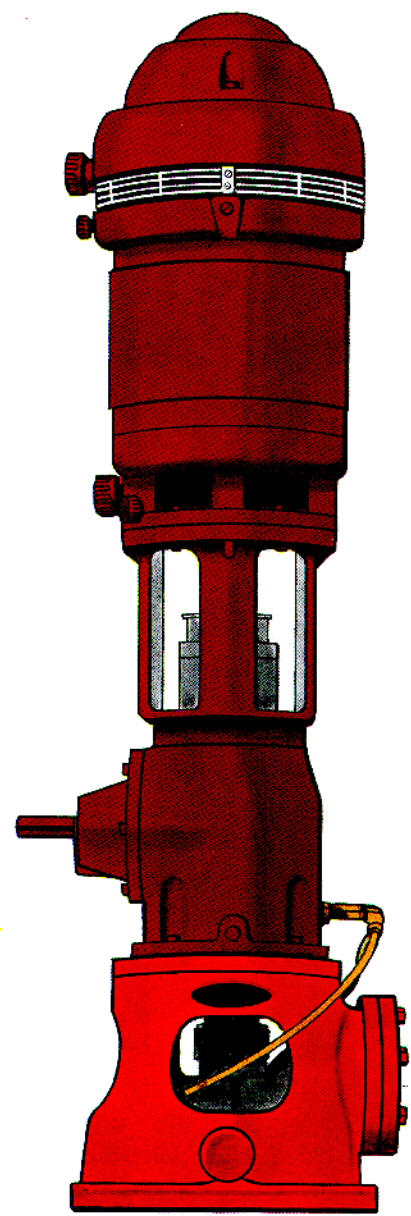
Motors furnished on Peerless vertical lineshaft turbine pumps are built to rigid NEMA standards by leading motor manufacturers. Vertical hollow-shaft motors are most commonly specified, although vertical solid shaft motors will be recommended where needed. Enclosures such as explosion-proof, totally-enclosed fan-cooled, etc., are available on order.

On pumps requiring motors rated 1000 hp and higher for continuous duty, synchronous motors should be considered. Resultant power savings will frequently more than offset the difference in initial cost.



RIGHT ANGLE GEAR DRIVE

Peerless supplies right angle gear drives for pumps in sizes to 700 hp in a wide variety of standard ratios. Special ratios and larger sizes are available. These drives can be powered by internal combustion engines, steam turbines, or horizontal electric motors. The gears used are high-capacity, spiral-beveled gears, ground and lapped for smooth, quiet performance, high efficiency and long life.



COMBINATION MOTOR-GEAR DRIVE

Where continuous pump duty is a must, regardless of power interruptions, the combination drive of a hollow-shaft electric motor and right angle gear drive with internal combustion engine is usually recommended. In event of electric power failure, the motor may be quickly disengaged and the load transferred to the alternate driver. Immediate, efficient take-over insures continuous water supply under all circumstances. Combination motor-gear drivers are available in sizes to 700 hp. Larger ratings can be supplied on special order.

DRIVER SELECTION — In selecting the drive for a vertical lineshaft turbine pump, whether it is a vertical electric motor, a right angle gear drive or a combination drive, it is most important that it be precisely engineered for the particular pumping application. The driver is an integral part of the pumping system. All drivers supplied with Peerless pumps meet rigid requirements and embody construction features which ensure satisfactory operation. The most important of these features are described below. The item numbers are keyed to the schematic drawing at the right.

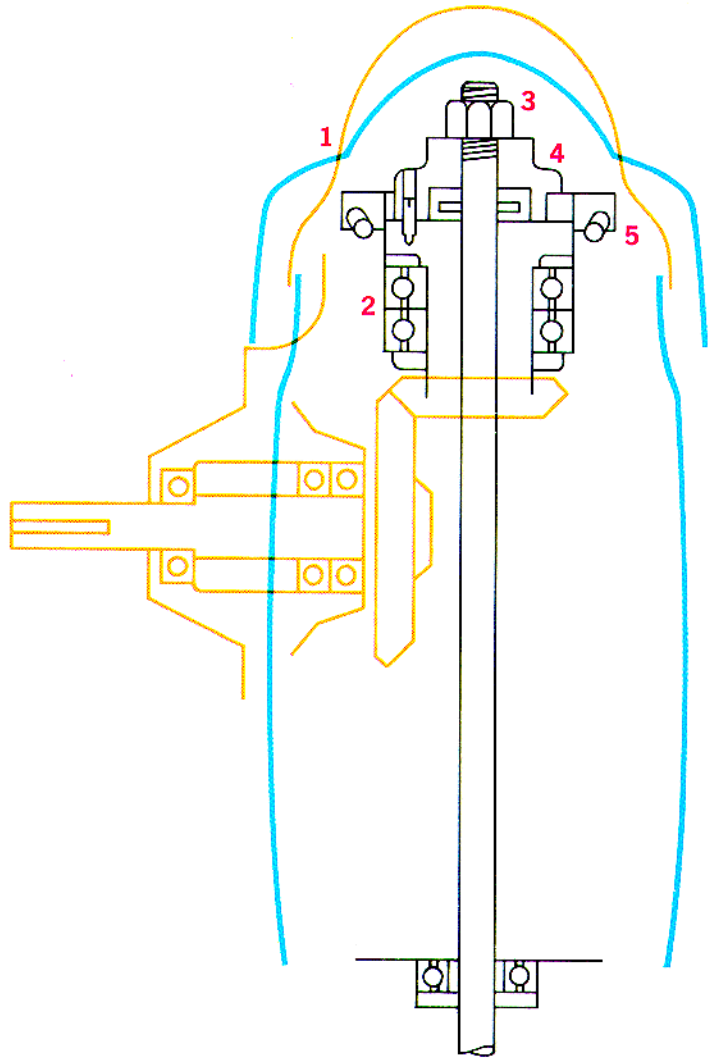
1 ENCLOSURES: Vertical turbine pumps are frequently installed outdoors, subject to wide extremes of weather. Enclosures of all drivers supplied by Peerless are designed and constructed to minimize the effects of the outdoor environment. Cooling air velocities are kept to a minimum to prevent drawing-in of foreign matter. All vents are screened to prevent entry of rodents, reptiles and other intruders, and are baffled for protection against wind-driven rain and snow. For most service conditions a standard weather-proof enclosure is adequate, but for extremely hot or cold climates, in explosive, corrosive or noxious environments, special enclosures are available at nominal extra cost. Peerless engineers will recommend the enclosure best suited to meet your requirements.

2 THRUST PROVISION: Every vertical pump exerts an axial load on the driver. The driver thrust bearings must be designed to carry the weight of the pump shafting, impellers, and the hydraulic thrust developed by the pump. Every pump has a thrust characteristic which is as unique to that pump as its head-capacity characteristic, which varies throughout the operating range of the pump unit. Peerless engineers work closely with motor and gear drive manufacturers to insure that your pump has adequate thrust bearing capacity in the vertical driver. Hence, thrust problems are anticipated in advance and provided for in the pump before delivery.

3 IMPELLER ADJUSTMENT: Each Peerless vertical pump driver is designed to provide simple, accurate and quick adjustment of the pump impellers from the surface. In a vertical hollowshaft driver this adjustment is made by means of a nut on the upper end of the shaft. After the top motor cover is removed, remove the lock screws from the adjusting nut and rotate the adjusting nut to the right or left until the proper setting is obtained for optimum pump efficiency. Detailed instructions for making this lateral adjustment in all Peerless drivers are provided in the instruction booklet accompanying each Peerless pump.

4 TOP DRIVE COUPLING: The cast iron or high tensile alloy steel top drive coupling provides perfect vertical alignment and assures smooth transfer of power to the shaft. This drive coupling disengages if the driver is accidentally reversed. In shallow settings, the pump may develop a momentary upthrust on starting. The hollowshaft driver is designed so the lower bearings cannot rise. To prevent upward movement of the pump shaft, it is only necessary to install hold-down bolts in this coupling.

5 NON-REVERSE RATCHET: Backspin protection on a vertical hollowshaft driver can be provided as an optional feature when required. A vertical turbine lineshaft pump will backspin when the driving power ceases and the water column in the pump recedes. Protection against backspin is recommended on automatic installations where damage could occur due to re-starting the driver while the pump is in reverse rotation. It is also recommended on water-lubricated installations where the setting is greater than 150 feet and a pre-lubrication system is not provided.



**THESE
KEY FEATURES
GIVE PEERLESS
DRIVERS AN
OUTSTANDING RECORD
OF LASTING
EFFICIENCY**

DISCHARGE HEADS STANDARDIZED TO ACCOMMODATE MAXIMUM NUMBER OF NEMA MOTOR SIZES

Maximum flexibility and versatility for future changes in pumping plant design are inherent in the design of the Peerless Pump discharge head. Larger or smaller motors, discharge, column and tube sizes can be routinely accommodated within wide limits in these designs. Peerless Pump discharge heads are designed functionally for maximum strength and utility, pleasing appearance and long life.

MATERIAL SPECIFICATIONS: The Peerless discharge head is made of ASTM A-48 class 30 cast iron with a minimum tensile strength of 30,000 psi. A safety factor of 4 is designed into the standard Peerless discharge head to provide maximum strength. Large hand holes permit easy access to all adjustable components. In general, a given discharge head may be used for either open or enclosed lineshaft construction.

WORKING LIMITS: Maximum pressures, standard heads to 175 psi. Optional construction to 400 psi working pressure. For higher working pressures consult the Peerless factory.

COLUMN SIZE AND SETTINGS: (standard materials)

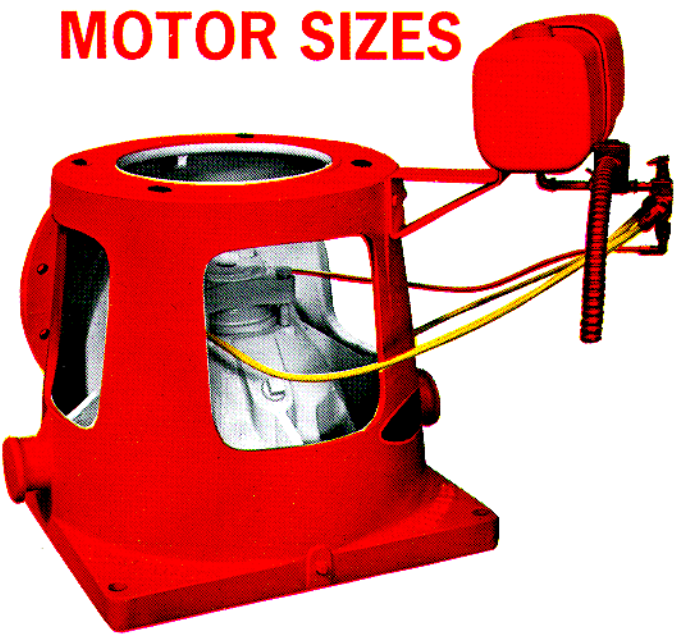
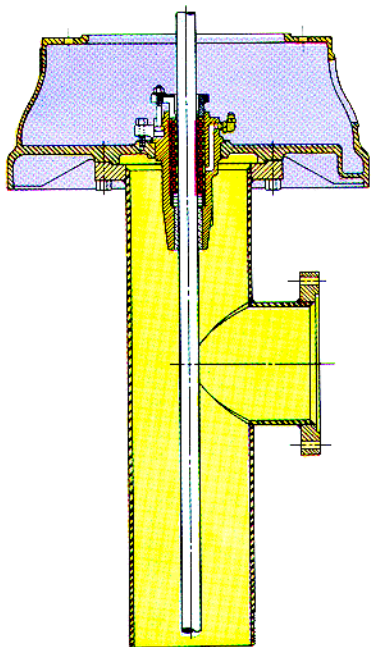
COLUMN SIZE	MAXIMUM SETTING
6" and smaller	1000 feet
8"	800 feet
10"	600 feet
12" and larger	500 feet

SPECIAL DESIGNS ARE AVAILABLE FOR SETTINGS TO 1500 FEET. CONSULT THE PEERLESS FACTORY.

PEERLESS DISCHARGE HEADS:

Head Model Designation	Discharge Size—Inches	Col. Piping Size—Inches	Motor Base Diameter—Inches	
			Max.	Min.
2½ x 2½ x 10	2½	2½	12	10
2½ x 3 x 10	2½	3	12	10
4 x 4 x 10C	4	4	12	10
6 x 6 x 12	6	6	16½	10
6 x 8 x 16½	6	8	20	16½
8 x 8 x 12	8	8	16½	10
8 x 8 x 16½	8	8	20	16½
10 x 10 x 16½	10	10	20	16½
10 x 10 x 20	10	10	20	16½
12 x 12 x 20	12	12	24½	16½
14 x 14 x 24½	14	14	24½	16½
16 x 16 x 30½	16	16	30½	24½

UNDERGROUND DISCHARGE. Many customer installation requirements are for below-the-ground discharge arrangements, such as shown in the illustration. This presents no problem in applying a Peerless pump. All that is required is an exact set of dimensions and flange specifications, and Peerless will take care of the rest. Consult your Peerless sales engineer or nearest distributor for details.



ADJUSTING NUT

The shaft adjusting nut is readily accessible by simply removing the driver cover. When the pump is stopped, the adjusting nut may be easily unlocked and turned to right or left, raising or lowering impellers to exact positioning for maximum sustained efficiency.

TOP DRIVE COUPLING

Cast iron or high tensile steel top drive coupling insures perfect vertical alignment and smooth transfer of power to the shaft. If motor is accidentally reversed the pump lineshaft couplings may unscrew and cause damage; therefore the top drive coupling is designed to automatically disengage in case of driver reversal. In shallow settings momentary upthrust may be a problem on startup. The lower driver bearing is designed so it cannot lift. It is only necessary to install hold-down bolts in the top drive coupling to prevent upward movement of the pump shaft.

OIL-LUBRICATED CONSTRUCTION FEATURES

AMBIENT TEMPERATURE COMPENSATED SOLENOID OILER

Positive operating electric solenoid provides automatic control of oil flow to drip regulator from the reservoir. Cooled by by-pass of well water.

TUBE NUT ASSEMBLY

This assembly serves two important functions: (1) provides simple, tamper-proof method of placing precise tension on oil tubing; (2) prevents contamination of the lubrication system by water being pumped with one easily accessible, permanent packing adjustment. The Peerless design also provides additional shaft support at this point by means of an oil-lubricated, sleeve-type, bronze bearing.

REFER TO P. 11 FOR DETAIL

STABILIZING SPIDERS

Tube stabilizing spiders pre-fitted over the shaft enclosing tube at intervals stabilize the tube within the column pipe.

LINESHAFT

Peerless Pump lineshaft is AISI C-1045 cold-drawn steel, stress-relieved, with a nominal tensile strength of 95,000 psi. Shaft loading meets ASA B-58.1 standards.

COUPLINGS

Peerless lineshaft couplings are for greatest strength and accuracy and perfect butt-fit of shaft ends in the center of the coupling. Relief hole in the center of the coupling wall allows escape of air and excess thread compound as the two shaft ends butt tightly together.

TUBING BEARINGS

Tubing bearings are made of special composition bronze, accurately machined and reamed to close tolerances smooth bearing surfaces. A helical groove is machined in the bearing to facilitate positive and uniform flow of oil over the bearing surface.

SHAFT ENCLOSING TUBING

Extra strong steel pipe provides rigid, vibration-free shaft support. Each tube is accurately machined to assure alignment and a water tight joint.

OIL-LUBRICATED TOP BOWL

TUBING BEARING ADAPTER

This adapter assures a water tight connection. It is used to connect column shaft enclosing tube to one of several different sized top bowls, affording versatility in selection of shaft size. It also provides additional shaft bearing support at this point, reducing wear and increasing pump life.

BY-PASS PORTS

These ports equalize the internal tubing pressure and prevent water from entering the oil tube and bearings. Multiple by-pass ports assure maximum effectiveness.

TOP BOWL BEARING

The main bearing of the top bowl is extra long to provide maximum shaft support at the transition between the impeller shaft and the pump shaft. The extra length and close fit provide an effective seal at this point.

STANDARD BOWL

BOWL VANES

Vanes are cast integrally in the pump bowl. Vane design is carefully matched with the impeller, and vanes are contoured to guide the flow to the next stage with minimum loss and maximum efficiency. The vanes also add materially to the rigid mechanical bowl strength.

TAPERED IMPELLER LOCK

Each impeller is securely fastened on the shaft by split-tapered impeller lock bushing. For bowl sizes 20 inch and larger, impellers are keyed to the shaft.

IMPELLERS

Enclosed type, cast iron-enamelled or cast bronze impellers are standard in Peerless pump construction. All vanes and guide passages are hand finished. Each impeller is balanced to insure smooth operation.

LATERAL BOWL WEAR RING

In addition to standard close-clearance side seal, the Peerless design provides an additional sealing surface. Each bowl is provided with a resilient, abrasion-resistant, rubber lateral bowl wear ring, reinforced with a rigid metallic core.

SAND LUGS

Sand lugs, built into the bowls, prevent cutting of bowl surfaces by eliminating rotation and vortexing of water-borne sand. Peerless pioneered this design feature.

SUCTION MANIFOLD BEARING

Extra long bearing permanently packed with special water resistant lithium-base grease insures stabilized shaft operation. Ultra-safe design: ratio of length to diameter, 5 to 1 or greater. Plug at bottom prevents flow of water through tail bearing. A labyrinth type bronze sand collar, locked to the impeller shaft, protects the bearing from abrasive wear.

SUCTION MANIFOLD

Suction manifold is provided with an extra long bearing to insure added strength and rigid support of the lower end of the pump shaft. It is threaded for connection to the suction pipe and strainer.

NON-REVERSE RATCHET

All vertical lineshaft turbine pumps will backspin when driving power ceases and water column in the pump recedes, unless provision is made to prevent it. This protection is recommended on automatic installations where damage could occur due to restarting while pump is in reverse rotation. It is also specified on water lubricated installations with settings deeper than 100 feet, where pre-lubrication system is not provided.

THRUST BEARINGS

Heavy duty type, angular contact thrust bearing is selected to carry the combined load of the pump shaft, impellers and hydraulic thrust with ample safety factor.

PEERLESS VERTICAL LINESHAFT TURBINE PUMP

OIL-LUBRICATED CONSTRUCTION

DISCHARGE HEAD

High strength castings of close-grained cast iron are manufactured in Peerless' own foundry. Large hand hole openings provide easy access to all adjustable components.

WATER-LUBRICATED CONSTRUCTION FEATURES

The water-lubricated type of construction differs from the oil-lubricated type in that the lineshaft bearings are lubricated by the well's own water rather than by oil. The bearing and journal construction of the water-lubricated pump is entirely different, as shown in the detailed part descriptions immediately below.

STAINLESS STEEL TOP SHAFT

All Peerless pump top shafts are precision high-tensile 400-Series stainless steel.

PACKING CONTAINER

The packing container assembly includes a grease-gun fitting in conjunction with an integrally-cast annulus to assure proper lubrication. In addition, a long bronze bearing serves the dual purpose of a throttle bushing and a support bearing.

COLUMN CONSTRUCTION

SPECIAL RUGGED SHAFT JOURNALS

Water lubricated AISI C-1045 lineshafts are equipped with husky flame sprayed stainless steel shaft journals. Optional lineshaft materials (without special journals) include 303, 316 or 416 stainless steel.

BEARING RETAINER ASSEMBLY

Special composition cast bearing retainers are centered in the column pipe coupling and tightly butted between pipe ends. These retainers maintain true vertical alignment of pump lineshaft. The water-lubricated bearings are extra-long, fluted, resilient rubber, securely fastened in the retainers by high-tensile, stainless steel snap rings. Fluted channels serve as an escape route for any particles of abrasives or sand carried in the water and assure adequate bearing lubrication.

WATER-LUBRICATED TOP BOWL

SAND COLLAR

Labyrinth type sand slinger is locked securely to impeller shaft. Protects top bowl bearing from abrasive wear.

TOP BOWL BEARING

Two extra-long bronze bearings provide maximum support.

STANDARD BOWL CONSTRUCTION

All Peerless standard bowl bearings are water-lubricated, so the design of Peerless bowls is identical in both oil- and water-lubricated type pump construction. Each complete bowl assembly is called a "stage." A pump stage consists essentially of a bowl and impeller, dual bearings, impeller lock and a lateral seal ring.

STAINLESS STEEL IMPELLER SHAFTING

All Peerless pump impeller shafts are precision, high tensile, 400-Series S.S.

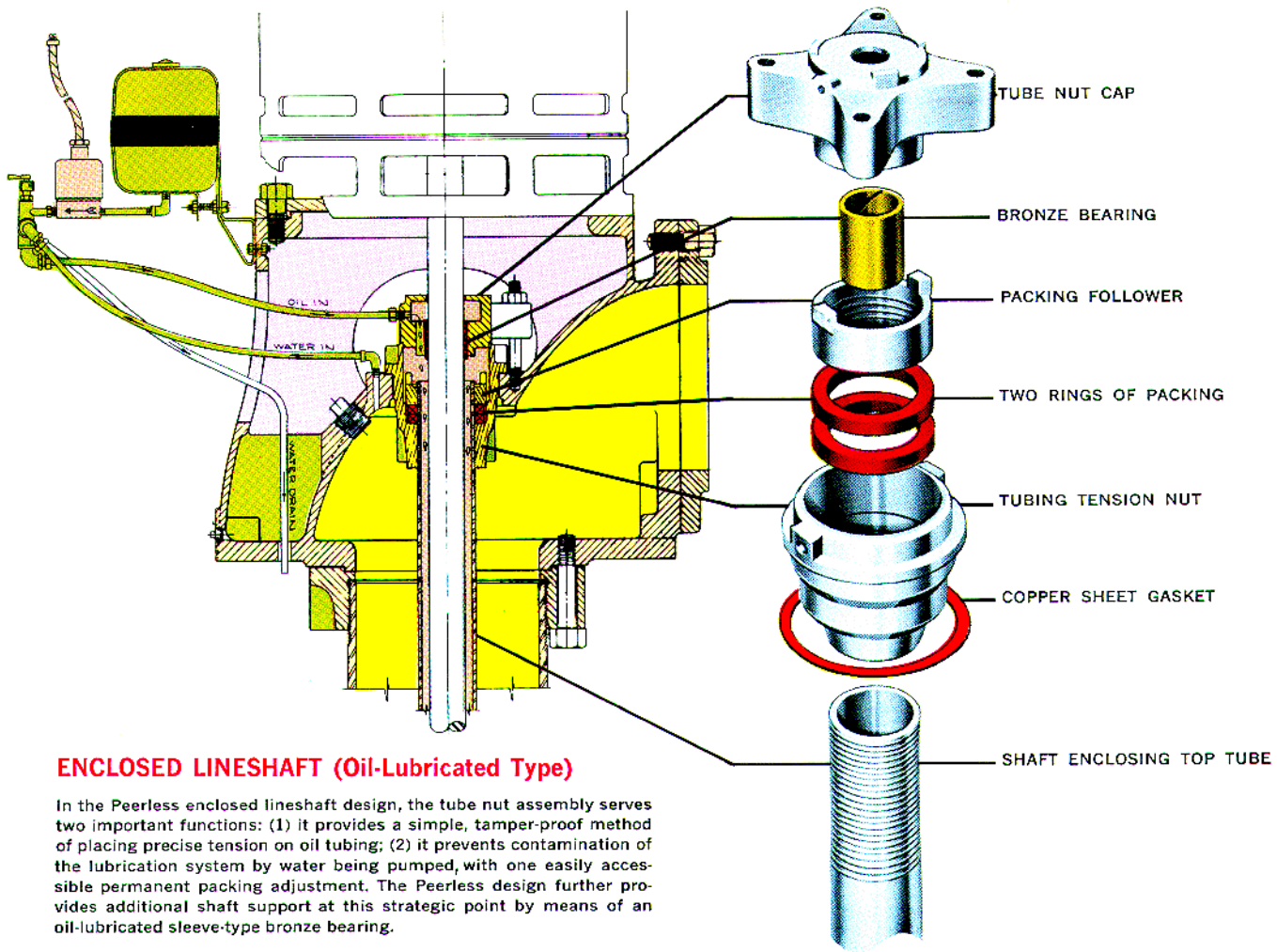
DUAL BOWL BEARINGS

Peerless utilizes both rubber and bronze bearings to take advantage of the superior qualities of each material for the longest possible pump life under the widest range of pump operating conditions.

STRAINER

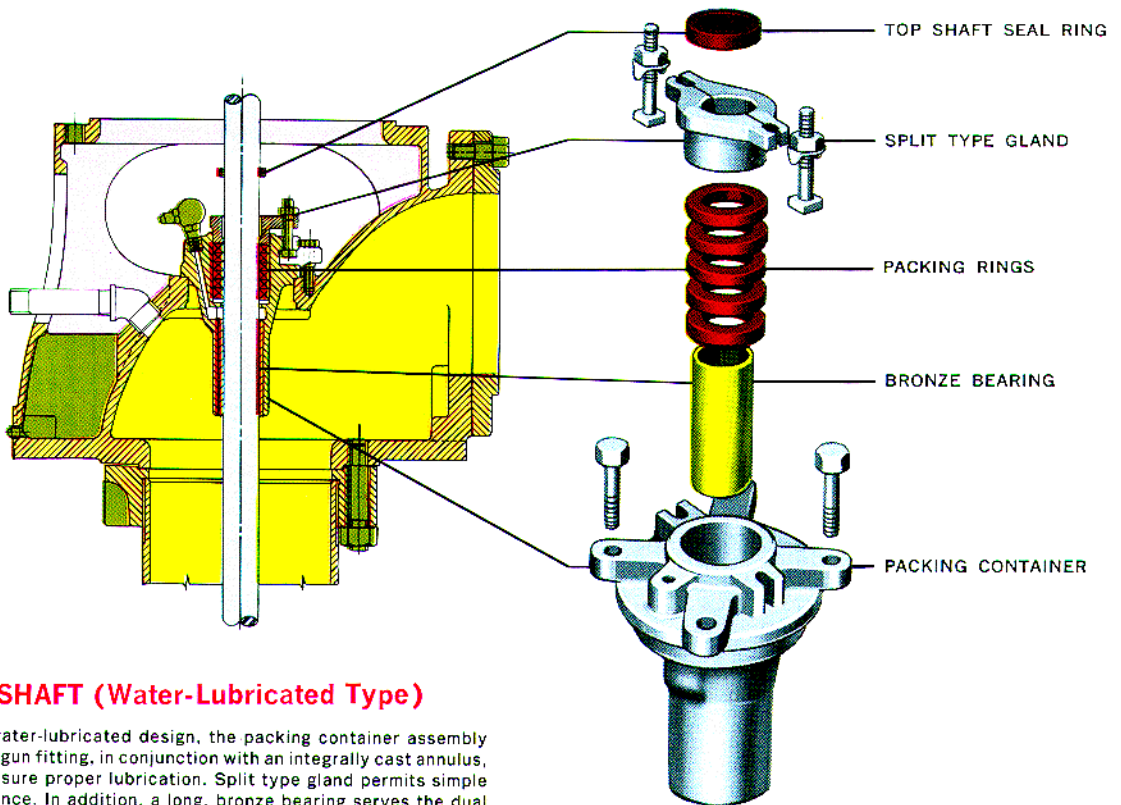
Corrosion-resistant strainer is constructed of heavy-gauge welded wire. Optimum-spaced openings permit unrestricted flow into the pump.

NOTICE: Materials of construction, specifications, dimensions, design features, and application, shown in this bulletin, are subject to change and/or modification without notice.



ENCLOSED LINESHAFT (Oil-Lubricated Type)

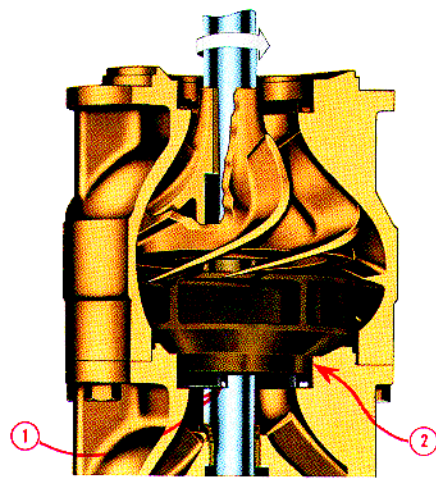
In the Peerless enclosed lineshaft design, the tube nut assembly serves two important functions: (1) it provides a simple, tamper-proof method of placing precise tension on oil tubing; (2) it prevents contamination of the lubrication system by water being pumped, with one easily accessible permanent packing adjustment. The Peerless design further provides additional shaft support at this strategic point by means of an oil-lubricated sleeve-type bronze bearing.



OPEN LINESHAFT (Water-Lubricated Type)

In the Peerless water-lubricated design, the packing container assembly includes a grease gun fitting, in conjunction with an integrally cast annulus, to provide and assure proper lubrication. Split type gland permits simple packing maintenance. In addition, a long, bronze bearing serves the dual purpose of throttle bushing and bearing support.

The lateral bowl wear ring (1) is mounted below the impeller skirt (2). Regardless of any wear which might take place on the side of the impeller skirt, the efficiency can be sustained by a simple impeller adjustment.



The Peerless lateral bowl wear ring is a heavy duty resilient rubber ring with a rigid metallic core embedded in it.

DOUBLE SEAL ASSURES LONGER SUSTAINED EFFICIENCY

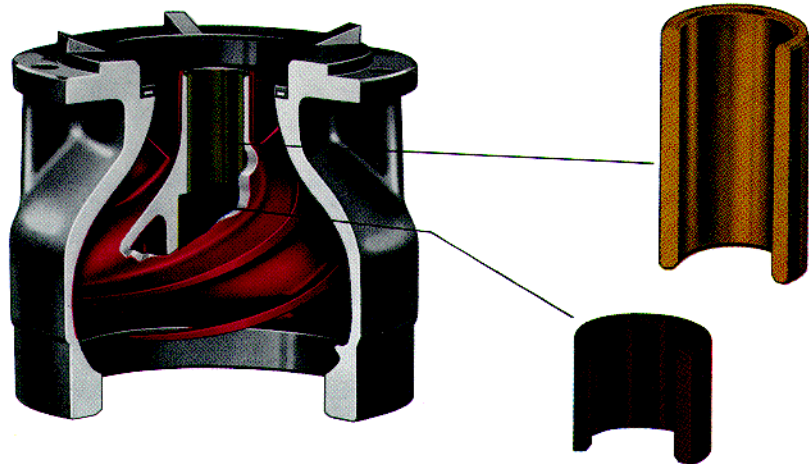
**IN
THE
PEERLESS
LINESHAFT
TURBINE
PUMP
MECHANICAL AND
HYDRAULIC
EXCELLENCE
SHOWS
UP
FAST**

Peerless Pump pioneered the double seal feature in vertical turbine pumps. This simple yet extremely effective principle provides for two sealing surfaces instead of one to prevent efficiency-robbing recirculation of liquid from high to low pressure areas within the bowl assembly. All centrifugal pumps depend upon a close-clearance side seal between the rotating impeller and the stationary bowl to limit recirculation. However, this side seal is subject to wear, abrasion and erosion under adverse operating conditions. The side seal clearances cannot be adjusted to compensate for this wear and the resulting efficiency loss.

Peerless double seal bowls provide an additional sealing surface in the horizontal plane which can be easily adjusted to sustain efficiency as wear occurs. To insure a good sealing surface in the bowl under all operating conditions, a unique lateral bowl wear ring is used. It is an abrasive-resistant rubber ring, reinforced internally with a heavy metallic core. Rubber has been found to be the best material available to withstand the highly abrasive action of sand in water.

AN IMPELLER TYPE AND SIZE FOR MOST EVERY APPLICATION

Peerless has attained its position of leadership by continually designing and developing impeller types and sizes for many different pumping requirements. Peerless offers the broadest hydraulic coverage of any manufacturer. Peerless therefore is in a good position to assure complete satisfaction of your requirements for vertical lineshaft turbine pumps. At the right are shown typical impeller configurations and corresponding head-capacity characteristics. There are many variations from those shown; these enable Peerless to provide the pump best suited for your needs. In effect, this means a custom-made pump for each individual job. Maximum value, high efficiency and economical long-term pump performance are assured in each application.



DEEPEST SETTING LINESHAFT PUMPS ARE PEERLESS PUMPS

Vertical lineshaft pumps set 500 feet below the surface of the ground have always been considered "deep setting" applications. By working with customers and through research, development and testing programs in our own laboratories, Peerless has successfully solved the many problems in applying vertical lineshaft pumps in settings to 1500 feet.

Some of the problems Peerless has successfully solved in relation to very deep setting lineshaft pumps are shaft stretch, lateral adjustment of impellers, thrust loading, bearing lubrication, weight, loading factors and deflection of complete bowl assemblies, prior to and during installation in the field.

In order to ease handling of bowl assemblies in the field, Peerless designed a tandem adapter so the entire bowl assembly could be shipped in component, easy to handle sections, to facilitate correct installation at the site.

ENAMELLED BOWLS

Peerless bowl design and construction is the result of exhaustive research and development. They effectively and efficiently convert velocity head into pressure head in each stage.

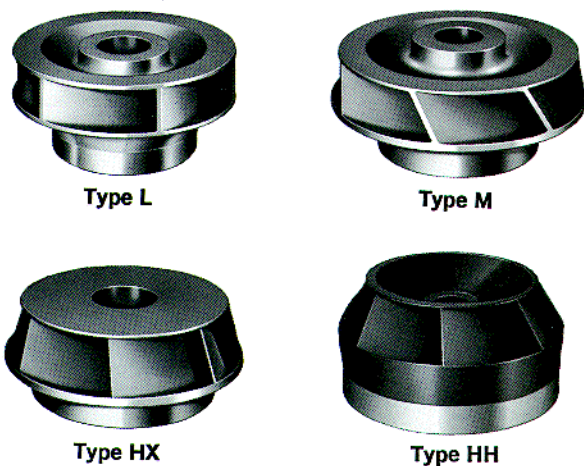
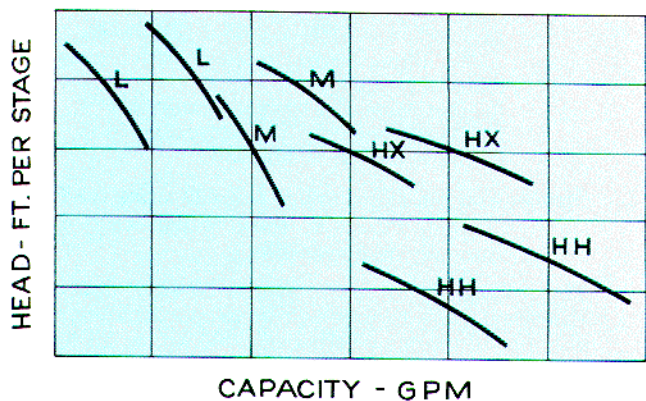
For most applications and usual water conditions, Peerless recommends vitreous enamelled bowls. Resistance to abrasion and resultant higher efficiency due to smoothest surfaces are important advantages. Peerless vitreous enamelling methods are the most modern available and insure against peeling, scaling and erosion under all ordinary water conditions.

DUAL RUBBER AND BRONZE BOWL BEARINGS

Peerless has found that in most pump applications the ideal bowl bearing material is a combination of rubber and bronze. The illustrations above show the arrangement of the bronze and rubber dual bearing combination. Note the rubber bearing is fluted for easy passage of any sand. However, in certain localities and under some water conditions, Peerless will recommend the use of an all-bronze bearing system in each bowl. Where this construction is indicated, Peerless will furnish it.

HIGH TENSILE STEEL LINESHAFTING

Peerless Pump lineshafting has a minimum tensile strength of 95,000 psi. Rigid standards in specifications of manufacture and final check for straightness and uniform diameter insure highest quality. Shaft threads are accurately machined to hardened gage standards. Final inspection and careful packing in rigid containers insure delivery of all Peerless shafting in perfect condition.



APPRAISING THE COST OF A PUMP

EFFICIENCY COUNTS

IN THE PEERLESS LINESHAFT TURBINE PUMP THE RIGHT BOWL ASSEMBLY FOR EACH APPLICATION SHOWS UP WHERE IT COUNTS

The ultimate cost of a pump is dependent upon its *price* and its sustained efficiency over an ample period of time to effect a complete and acceptable amortization.

Most pumps are, in fact, purchased by this method, the *price* of the pump being reevaluated higher or lower in terms of its efficiency rating.

The example below illustrates how, in a given pump application, a higher price for one pump may be more than off-set by higher operating efficiencies over its amortization period.

Peerless has always endeavored to provide high sustained efficiencies in its pumps. Peerless welcomes comparisons of its pumps with others on the basis of efficiencies maintained over the years as shown below.

Remember: the term "efficiency" as used in evaluating a pump would be of no value, if it could not be reduced to terms of actual pumping cost, *expressed in dollars*.

In the example below, the following pump data is assumed; capacity: 2700 gpm; head: 300 feet; motor: 250 hp

PUMP A — LAB. EFF. — 88.5%

Lab. eff.	= 88.5%
Field eff.	= 85%
Total load on motor (A)	= 241.2 BHP
Motor eff.	= 92.5%
Overall eff.	= 78.6%
Input HP	$= \frac{241.2}{0.925} = 261 \text{ BHP}$

PUMP B — LAB. EFF. — 85%

Lab. eff.	= 85%
Field eff.	= 81.5%
Total load on motor (B)	= 251.5 BHP
Motor eff.	= 92.5%
Overall eff.	= 75.4%
Input HP	$= \frac{251.5}{0.925} = 272 \text{ BHP}$

Difference: 272 — 261 BHP = 11 BHP or cost:
24 hrs/day, 365 days/yr for 10 years:
Electricity cost @ 5¢ per KWH.
 $11 \times 0.746 \times 8760 \times \$0.05 = \$3594/\text{yr}$.
\$3594 annual saving in power with the more efficient pump.
Present value of a 10 year annuity of
\$3594 per year @ 15% interest =
 $\$3594 \times 5.0188 = \$18,037$

Hence: You can afford to pay \$18,037 MORE for Pump A than Pump B, since it will save \$3594 annually on power bills.

The savings shown above are, to be sure, dramatic. However, these savings will be proportionately sizeable for all pumps whether of 2500 hp, or 25 hp, if high efficiency—both initial and sustained—is a major criterion of making a pump selection.

Consult your nearest Peerless sales office for complete information on how to figure true pumping costs.

PUMPING LIQUIDS OTHER THAN WATER

Head: The head of a pump is generally expressed in feet and is so plotted on performance curves. This head developed, expressed in feet, is the same irrespective of the fluid pumped. However, the head expressed in pounds per square inch (psi) will be different for fluids of different specific gravity. The heavier the fluid the greater will be the head expressed in psi for a pump. The relation of feet head and psi is:

$$\frac{\text{ft} \times \text{sp-gr}}{2.31} = \text{psi} \quad \text{or} \quad \frac{\text{psi} \times 2.31}{\text{sp-gr}} = \text{ft}$$

Horsepower. Pump horsepower is changed with any change in specific gravity. Pump horsepower curves, unless otherwise noted, are plotted for water, which has a specific gravity of 1.00 at normal temperatures. Any increase or decrease in specific gravity will proportionately increase or decrease the horsepower. The general formula for calculating horsepower:

$$\text{bhp} = \frac{\text{gpm} \times \text{total head in feet}}{3960 \times \text{efficiency}}$$

is based upon water, i.e., a specific gravity of 1.00. When the sp-gr is other than 1.00, the formula should be:

$$\text{bhp} = \frac{\text{gpm} \times \text{total head in feet}}{3960 \times \text{efficiency}} \times \text{sp-gr}$$

Efficiency. Pump efficiency (water to water)

$$= \frac{\text{gpm} \times \text{total head in feet}}{3960 \times \text{brake hp to pump}}$$

Field overall efficiency

$$= \frac{\text{gpm} \times \text{total head in feet}}{3960 \times \text{input hp to pump motor}}$$

COST PER 1000 GALLONS

(not gallons per minute) for each foot of head

$$= \frac{.00315 \times R}{E_o} \quad \text{or} \quad \frac{.189 \times R}{E_p \times E_m \times 60}$$

Where: .189 = Theoretical kw as stated above

R = Power cost per kwh

E_p = Pump efficiency

E_m = Motor efficiency

E_o = Overall plant efficiency

60 = Minutes

Example: Find the cost per 1000 gallons (not gpm) per foot head, of a pumping plant whose overall plant efficiency (E_o) is 60% (.60), power rate, five cents (\$.05) per kwh. Substituting in formula:

Cost per 1000 gallons per foot head

$$= \frac{.00315 \times .05}{.60} = \frac{.0001575}{.60} = \$0.0002625$$

If the pump is lifting water over a 120-foot head, then the cost per 1000 gallons (not gpm) delivered would be: \$.0002625 × 120 = \$.0315.

Pumping costs per any given condition of capacity or head may be determined by using the following formula:

COST PER HOUR

$$= \frac{.000189 \times \text{gpm} \times \text{Total Head} \times \text{Power Rate}}{\text{Overall Plant Efficiency}}$$

Example: Find the cost per hour of a pump delivering 500 gpm against a 120-foot head, overall plant efficiency of pump 60% (.60), power rate five cents (\$.05) per kwh.

Substituting in formula we have: Cost per hour

$$= \frac{.000189 \times 500 \times 120 \times .05}{.60} = 94.5 \text{ cents}$$

COST PER ACRE-FOOT

$$= \frac{1.023 \times \text{Total Head} \times \text{Power Rate}}{E_o}$$

Example: Find the cost per acre-foot of a pump delivering 500 gpm against a 120-foot head, overall plant efficiency of pump 60% (.60), power rate five cents (\$.05) per kwh.

Substituting in formula: Cost per acre-foot

$$= \frac{1.023 \times 120 \times .05}{.60} = \$10.23$$

KILOWATT HOURS REQUIRED

$$\text{Per 1000 Gallons} = \frac{\text{kw} \times 16.66}{\text{gpm}}$$

kw = Kilowatts input to meter, based on plant efficiency (wire to water).

kw = hp to pump × .746, based on pump efficiency (water to water).

$$\text{Pump efficiency} = \frac{\text{gpm} \times \text{head}}{3960 \times \text{bhp (to pump)}}$$

$$1 \text{ Horsepower} \begin{cases} = 33,000 \text{ ft lbs per minute} \\ = 550 \text{ ft lbs per second} \\ = 0.746 \text{ kw} \end{cases}$$

TECHNICAL INFORMATION AND PRODUCT BULLETINS

Peerless Pump maintains one of the most comprehensive supplies of descriptive product bulletins and technical information bulletins of any pump manufacturer. There is a product bulletin available on each vertical and horizontal pump in the Peerless line. Technical Information Bulletins (TIB) cover subjects related to hydraulics and pump application such as "Sump Design" etc. All are available free. Request copies of bulletins on the product or technical subject in which you are interested from your Peerless Pump representative.



THE PEERLESS INDUSTRIAL TURBINE PUMP

Rugged heavy duty Peerless industrial turbine pumps are available for capacities up to 150,000 gallons per minute, heads up to 1,000 psi. Corrosion resistant materials are available to resist attack by most industrially pumped liquids. Numerous configuration options allow custom-engineered construction tailored to fit the requirements of your application. Ask for brochure B-110.



DEEP WELL SUBMERSIBLE PUMP THE PEERLESS SUBMERSIBLE

A wide selection of head-capacity ranges assures plenty of water from deep wells. Incorporates many of the same quality construction features found in the lineshaft turbine pump. Range: heads to 1000 feet, capacities to 8000 gpm, motors to 500 hp. Ask for brochure B-700 A.



Peerless Pump Company

P.O. Box 7026 • Indianapolis, IN 46207-7026
Phone: (317) 925-9661 • Fax: (317) 924-7388