



Dean Pump Division

ANSI/ASME B73.1

Horizontal Process

pH2140
Telescoping
Guard



pH2140
C-Face
Adapter



Dean Pump Series pH Centrifugal Process Pumps

- Capacities to 3200 GPM (726 m³/hr)
- Heads to 800 feet (245 m)
- Pumping temperatures to 500°F (260°C)
- Working pressures to 375 PSIG (2585 kPa)

Experience

Dean Pump is recognized as an industry leader in the design and manufacture of horizontal centrifugal process pumps used extensively in the chemical and petrochemical industries, power plants, pulp and paper, mining, pharmaceutical and food processing industries.

When Dean Pump introduced the pH centrifugal process pump in 1958, the chemical processing industry recognized it as the model for the proposed ASA Standard Chemical Pump. Shortly thereafter, the Manufacturing Chemist Association (MCA) adopted, with minor changes, the service proven Dean pH pump as the American Voluntary Standard (AVS). Subsequently, the American National Standards Institute approved the AVS Specifications as national standard B123.1-1971. This standard was later revised and approved as ANSI/ASME B73.1M-1984. Dean Series pH pumps continue to meet or exceed the latest revised B73.1 standard.

Dean Series pH centrifugal process pumps are designed to insure long, continuous service life at low cost. Each phase in the production of these pumps is meticulously monitored by an independent quality control department.

Pump Sizes

The Dean Series pH pump is an end-suction back pull out design regularly available

in 22 sizes and divided into four size classifications:

- the pH2110 Series in 5 sizes
- the pH2140 Series in 11 sizes
- the pH240/pH340 Series in 4 sizes
- the pH250 Series in 2 sizes

Materials

Standard materials of construction include ductile iron, 316SS, CD4MCu, and Alloy 20. Additional higher metal alloys (Hastelloy B and C, Titanium, etc.) are available upon request. (Standard Materials of Construction chart is available on Page 3).

Parts Interchangeability

The Series pH provides the ultimate in standardization of process pumps. With wide parts interchangeability among pump sizes, fewer parts are required for inventory. A complete stock of spare parts is readily available from Dean Pump or its network of stocking distributors, thereby reducing shipping time to a minimum.

All Series pH parts, with the exception of the casing (and in some sizes, the impeller), are interchangeable with the Series pHP Self-Priming Pump.

Shaft Sealing

Dean Pump offers a broad line of mechanical seals and standard packing sets to solve the most difficult sealing problems. This feature gives Series pH pumps the versatility to handle a wide range of chemical services. A variety of seal chambers such as standard bore, jacketed, large taper bore, and large cylindrical bore are available for specific applications.

MECHANICAL DESIGN SPECIFICATIONS

PUMP TYPE	pH2110	pH2140	pH240	pH340	pH250
Direction of Rotation (Viewed from Coupling End)	CW	CW	CW	CW	CW
Horsepower Rating @ 3500 rpm @ 1750 rpm @ 1150 rpm	35 HP 15 HP 10 HP	100 HP 40 HP 30 HP	— 100 HP 60 HP	200 HP 100 HP —	— 125 HP 75 HP
Hydrostatic Test Pressure	430 psig	430 psig	430 psig	565 psig	450 psig
Corrosion Allowance	1/8"	1/8"	1/8"	1/8"	1/8"
Impeller Balance	Single Plane Dynamic Balance				
Flanges ANSI Class Facing – standard – optional	150 F.F. R.F.	150 F.F. R.F.	150 F.F. R.F.	300 F.F. R.F.	300 F.F. R.F.
Finish	125 Ra	125 Ra	125 Ra	125 Ra	125 Ra
Stuffing box jacket pressure maximum	125 psig	125 psig	125 psig	125 psig	125 psig
Bearing housing cooler pressure maximum	125 psig	125 psig	125 psig	125 psig	125 psig
Maximum Suction Pressure	275 psig	275 psig	275 psig	375 psig	300 psig
Bearings:					
Thrust Bearing	5306	5309	7311 BG	7311 BG	5312
Radial Bearing	6207	6309	6311	6311	6312
Lubrication	Oil	Oil	Oil	Oil	Oil
Seal Chamber Dimensions:					
Tapered Seal Chamber Length (Depth)	2 3/8"	3 1/16"	3 1/16"	3 1/16"	4 5/8"
Inside Diameter (Bore)	2 7/8"	3 1/2"	3 7/8"	3 7/8"	4 1/4"
Shaft Sleeve Diameter	1 3/8"	1 3/4"	2 1/8"	2 1/8"	2 1/4"
Cylindrical Seal Chamber Length (Depth)	1 7/8"	2 1/4"	2 3/16"	2 3/16"	3 5/16"
Inside Diameter (Bore)	2 1/8"	3 1/2"	3 7/8"	3 7/8"	4 1/4"
Shaft Sleeve Diameter	1 3/8"	1 3/4"	2 1/8"	2 1/8"	2 1/4"
Stuffing Box Dimensions:					
Length (Depth)	2 1/8"	2 3/4"	2 3/4"	2 3/4"	3 7/8"
Inside Diameter (Bore)	2"	2 1/2"	2 1/8"	2 1/8"	3 1/4"
Shaft Sleeve Diameter	1 3/8"	1 3/4"	2 1/8"	2 1/8"	2 1/4"
Lantern Gland Width	7/16"	5/8"	5/8"	5/8"	3/4"
Packing Size – Square	5/16"	3/8"	3/8"	3/8"	1/2"
Number of Rings with Lantern Ring	5	5	5	5	6
Number of Rings without Lantern Ring	6	7	7	7	7
Spacing with Lantern Ring	2-G-3	2-G-3	2-G-3	2-G-3	3-G-3
Pump Shaft Dimensions:					
Span Between Bearings	3 15/16"	6 3/8"	5 5/16"	5 5/16"	7 15/16"
Span Between Radial Bearing and Impeller	5 13/16"	7 7/8"	8 3/16"	8 3/16"	10 3/4"
Diameter Under the Sleeve	1 1/8"	1 1/2"	1 7/8"	1 7/8"	2"
Diameter with No Sleeve	1 3/8"	1 3/4"	2 1/8"	2 1/8"	2 1/4"
Diameter at Coupling	7/8"	1 1/8"	1 5/8"	1 5/8"	1 5/8"
Diameter Between Bearings	1 1/2"	2 1/8"	2 1/4"	2 1/4"	2 3/4"
Diameter at Impeller	3/4"	1 1/4"	1 1/4"	1 1/4"	1 5/8"
L ¹ /D ⁴ Ratio					
Sleeved Shaft	123	96	44	44	78
Solid Shaft (No Sleeve)	55	52	27	27	48

MAX. ALLOWABLE PUMP SUCTION PRESSURE (PSI) WITH

PUMP SIZE	With Balance Holes			Without Balance Holes			Values of F _n *		
	3500 RPM	1750 RPM	1150 RPM	3500 RPM	1750 RPM	1150 RPM	3500 RPM	1750 RPM	1150 RPM
pH2110	maximum allowable suction pressure = maximum allowable discharge pressure less developed head						psi	psi	psi
							18	4.5	2.0
							18	4.5	2.0
							22	5.5	3.5
pH2140	maximum allowable suction pressure = maximum allowable discharge pressure less developed head						18	4.5	2.0
							18	4.5	2.0
							22	5.5	3.5
							18	4.5	2.0
pH240	maximum allowable suction pressure = maximum allowable discharge pressure less developed head						18	4.5	2.0
							18	4.5	2.0
							22	5.5	3.5
							18	4.5	2.0
pH340	maximum allowable suction pressure = maximum allowable discharge pressure less developed head						18	4.5	2.0
							18	4.5	2.0
							22	5.5	3.5
							18	4.5	2.0
pH250	maximum allowable suction pressure = maximum allowable discharge pressure less developed head						18	4.5	2.0
							18	4.5	2.0
							22	5.5	3.5
							18	4.5	2.0

Seal Chamber Pressure:

With Balance Holes: seal chamber pressure = suction pressure

Without Balance Holes: Pumps are normally furnished without balance holes.

seal chamber pressure = suction pressure + (F_n x s.g.)

* Seal pressure developed by impeller with a 1.0 specific gravity (water at ambient temp 60°F/16°C)

STANDARD MATERIALS OF CONSTRUCTION

Part No.	Part Name	Ductile Iron	316SS	Alloy 20	CD4MCu	Hast.	Titanium
3	Impeller	C.I. (1)	316 (12)	Alloy20 (2)	CD4MCu	Hast.	Titanium
5	Casing	D.I. (10)	316 (12)	Alloy20 (2)	CD4MCu	Hast.	Titanium
5A	Casing Drain Plug	1020 Steel	316SS	316SS	Alloy 20	Hast.	Titanium
5D	Casing Capscrew	▲†	Steel (11)				
7	Cradle Spacer	①✕†	D.I. (13)				
7G	Spacer to Brg. Hsg. Capscr.	①†✕†	1020 Steel				
9	Bearing Housing Foot	①	C.I. (1)				
9F	Jack Bolt	⑥✕	1020 Steel				
9G	Locknut	⑥✕	1020 Steel				
10	Shaft Sleeve	▲†✕†	316SS	Alloy 20	316SS	Hast.	Titanium
10K	Sleeve Key	▲†✕†	304SS				
13	Seal Chamber Gland	316SS	316SS	Alloy 20	316SS	Hast.	Titanium
14	Gland Stud	304SS		Alloy 20	304SS	Hast.	Titanium
15	Gland Nut	304SS		Alloy 20	304SS	Hast.	Titanium
17	Lantern Ring	②	Teflon ■				
	Lantern Ring	⑤	C.I. (1)	316SS	316SS	Alloy 20	Hast. Titanium
18	Splash Collar	④✕†	Cast Iron				
22	Casing Back Cover	✕†	D.I. (10)	316 (12)	Alloy 20 (2)	CD4MCu	Hast. Titanium
22A	Back Cover to Cradle Capscrew	▲†✕†	1020 Steel				
25	Radial Bearing	▲†✕†	—	—	—	—	—
25A	Thrust Bearing	▲†✕†	—	—	—	—	—
26	Bearing Housing	†✕†	D.I. (13) for pH2110 and C.I. (1) for all others				
27	Seal Ring	①†✕†	C.I. (1)				
28	Bearing End Cover	▲†✕†	C.I. (1)				
28A	Bearing End Cover Capscrew	▲†✕†	1020 Steel				
28B	End Cover Adjusting Screw	②	1020 Steel				
28C	Adjusting Screw Locking Nut	②	1020 Steel				
29	Pump Shaft	▲†✕†	Steel (5)				
31	Thrust Bearing Lock Nut	⑤†✕	1020 Steel				
31A	Thrust Bearing Lock Washer	⑤†✕	1020 Steel				
56	Casing Foot	⑤	C.I.				
56A	Casing Foot Capscrew	⑤†	1020 Steel				
56B	Casing Foot Dowel	⑤†	1020 Steel				
75	Tapered Retaining Ring	②†	Steel				
75A	Tapered Retaining Ring	③▲	Steel				
75B	Large Retaining Ring	▲†✕†	Steel				
76	Oil Seal – Front	⑤	Buna (7)				
	Labyrinth Seal – Front	②	Bronze & Viton ■				
76A	Oil Seal – Rear	⑤	Buna (7)				
	Labyrinth Seal – Rear	②	Bronze & Viton ■				
77	Casing Gasket		Teflon ■				
77A	Impeller Gasket	▲†✕†	Teflon ■				
77B	End Cover Gasket	②	Buna (7)				
	End Cover Gasket	⑤	Manila Paper (9)				
77E	Oil Cooler Gasket		Fibre Sheet (8)				
80	Vent	▲†✕†	—				
95A	Mechanical Seal Stationary	▲†✕†					
95B	Mechanical Seal Rotary	▲†✕†					
105	Adjusting Sleeve	④✕†	AISI 416				
105A	Adjusting Sleeve Nut	④✕†	1020 Steel				
109	Oil Cooler Assembly	▲†✕†	SS Tubing with Steel Fins and Steel Fittings				

① pH2140, pH240, pH340 and pH250 only

② pH250 only

③ pH2110 only

④ pH240 and pH340 only

⑤ pH2140 only

⑥ pH240 and pH340 only

⑦ pH2110 and pH2140 only

⑧ pH2140, pH240 and pH340 only

▲ Denoted parts are interchangeable in all pH2110 pumps

† Denoted parts are interchangeable in all pH2140 pumps

✕ Denoted parts are interchangeable in all pH240 and pH340 pumps

‡ Denoted parts are interchangeable in all pH250 pumps

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MATERIAL SPECIFICATIONS (REFER TO NUMBERS IN PARENTHESES)

- | | |
|-----------------------------------------|-----------------------------------------------------------|
| (1) Cast Iron | (8) Fibre Sheet — Non-Asbestos Fibre |
| (2) Alloy 20: ASTM #A744, Grade CN-7M | (9) Manila Paper |
| (3) Cast Steel: ASTM #A216, Grade WCB | (10) Ductile Iron: ASTM #A395 |
| (4) Steel: ASTM #A194, Grade 2 | (11) Steel: ASTM #A449: pH340 Studs of ASTM #193 Grade B7 |
| (5) Alloy Steel: 125,000 TS, 100,000 YP | (12) 316SS: ASTM #A744 Grade CF-8M |
| (6) Steel: ASTM #A193, Grade B7 | (13) Ductile Iron ASTM #A536 |
| (7) Buna "N" Rubber | |

1. CASING COVER

Standard bore, jacketed, large taper bore, large cylindrical bore. Designed to provide the best environment for the specific application and service conditions.

2. INTEGRAL ONE-PIECE CASING FLANGES

Flanges dimensioned according to ANSI/ASME B16.5 Class 150. Flat face flanges (Class 150) are standard. Raised face flanges (Class 150) are available as an option.

3. SEALING FLEXIBILITY

Choice of packed box or mechanical seal. Wide range of sealing arrangements (inside/outside, single/double, balanced/unbalanced, etc.) available to meet specific application and service conditions.

4. FULLY OPEN IMPELLER

The fully open design provides smooth inlet passages for solids handling and stringy material, low NPSH, and minimum stuffing box pressure. The impeller design transmits low axial loads on the bearings.

5. SHAFT SLEEVE

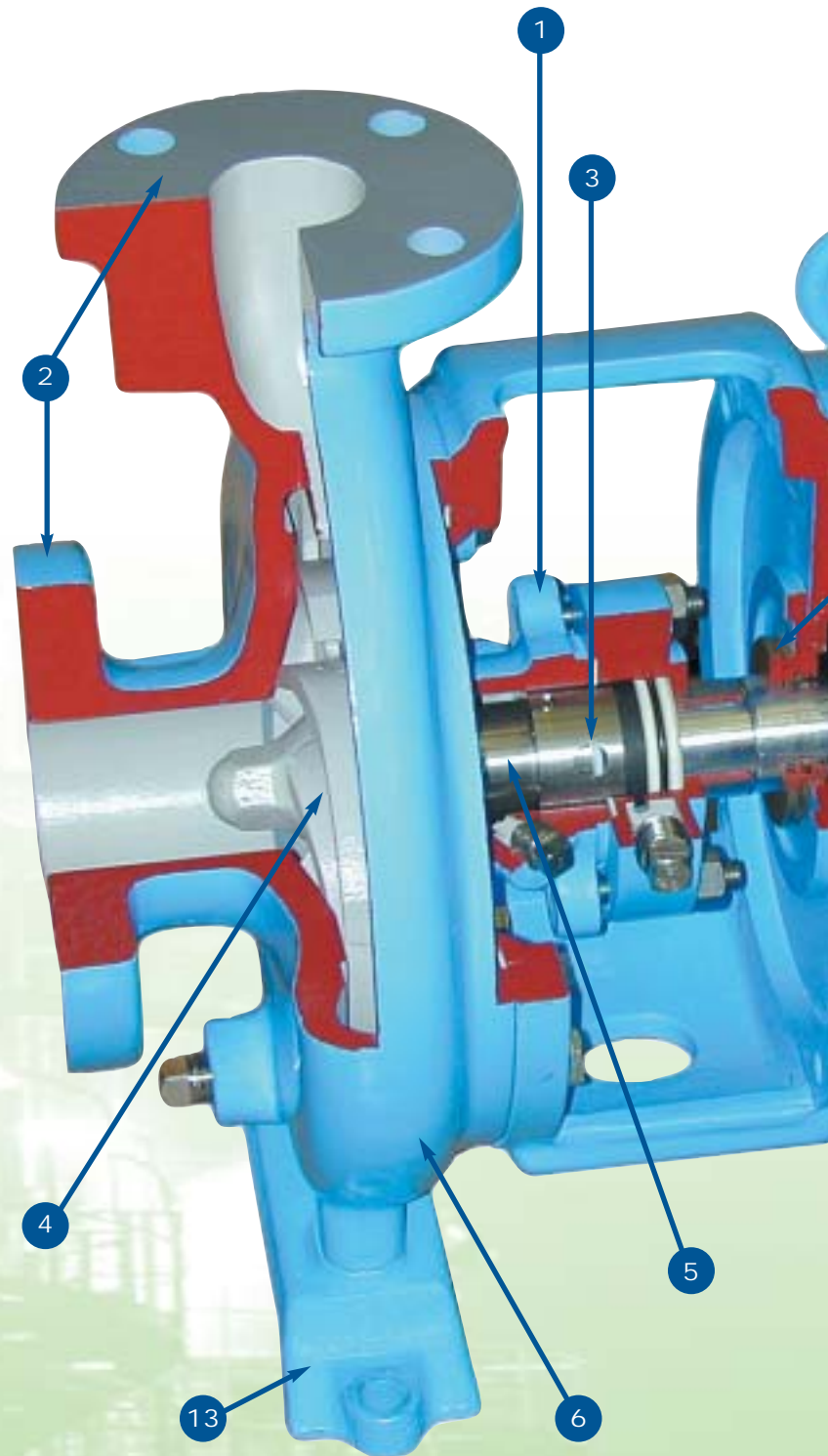
"Hook" type shaft sleeves are standard. Alloy, hard-facing, hardened chrome 11/13, or ceramic coatings are available as options. Solid shafts are also available.

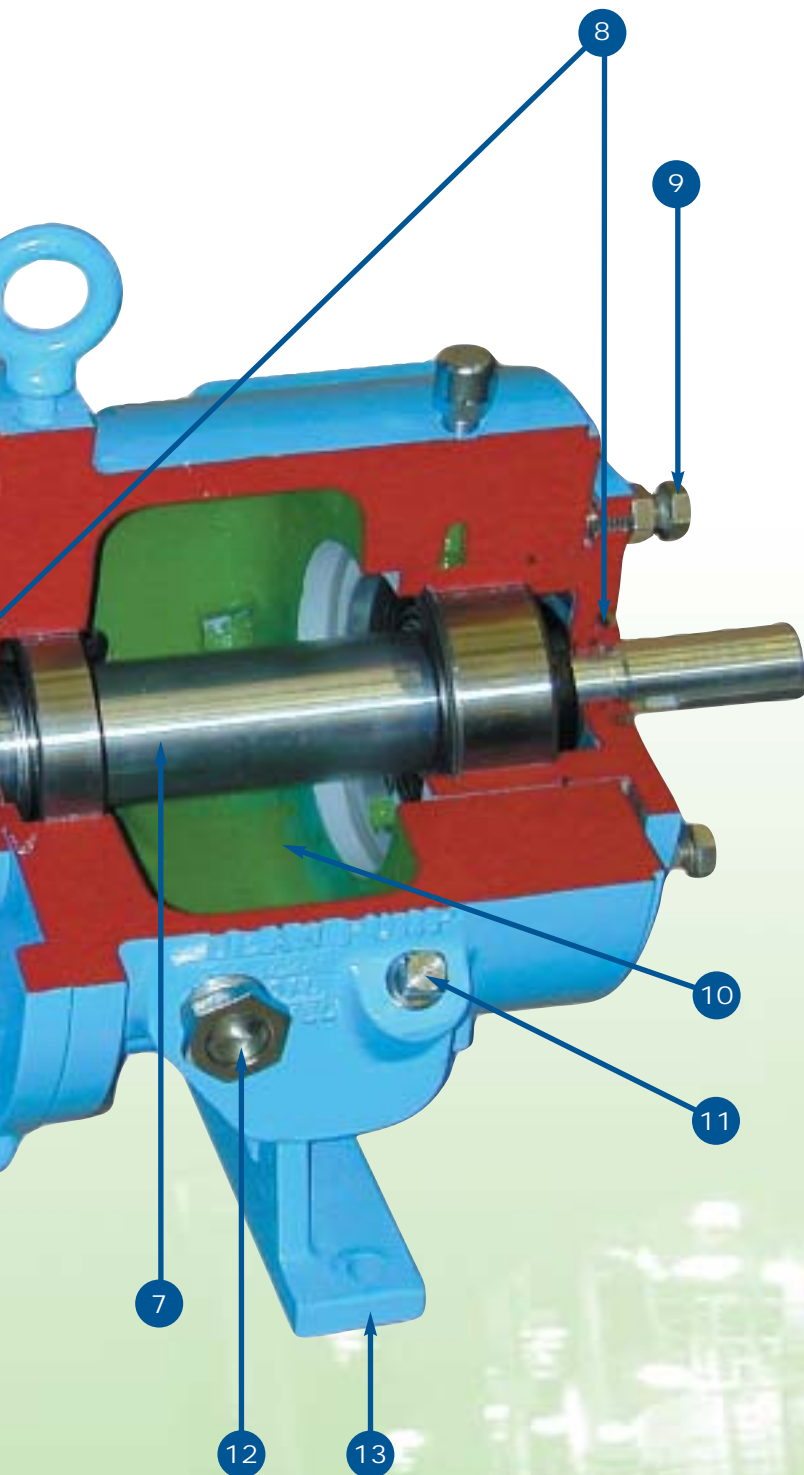
6. ANSI/ASME B73.1 DIMENSIONAL CASING

Permits maximum interchangeability of pumps with existing ANSI pumps eliminating any need for piping or foundation changes. Back pull-out design for ease of maintenance. Top centerline discharge for self-venting of casing. Casing drain/plug is a standard feature on Ductile Iron construction only.

7. HEAVY DUTY SHAFT AND BEARINGS

Carbon steel shaft (316SS optional) designed for minimum deflection of less than 0.002" (0.05 mm) at the seal faces. Double row thrust bearings and single row radial bearings are sized for a 2 year minimum life and a 10 year average life. With minimized bearing spans and overhung lengths, Dean's L^3/D^4 ratio is one of the best in the business.





8. STANDARD LABYRINTH SEALS
(pH2110 & pH2140 only)
Rugged bronze construction with Viton O-rings. These seals will ensure that the bearings are kept properly lubricated and uncontaminated throughout their project design life. Available as an option on the pH240/pH340/pH250.

9. EXTERNAL IMPELLER ADJUSTMENT
No shimming required. Allows field setting of impeller-to-casing clearance. For the pH2110 and pH2140, impeller adjustment is accomplished by adjusting screws in the bearing end cover. External adjustment for the pH240/pH340/pH250 is accomplished by an adjusting sleeve and locknut.

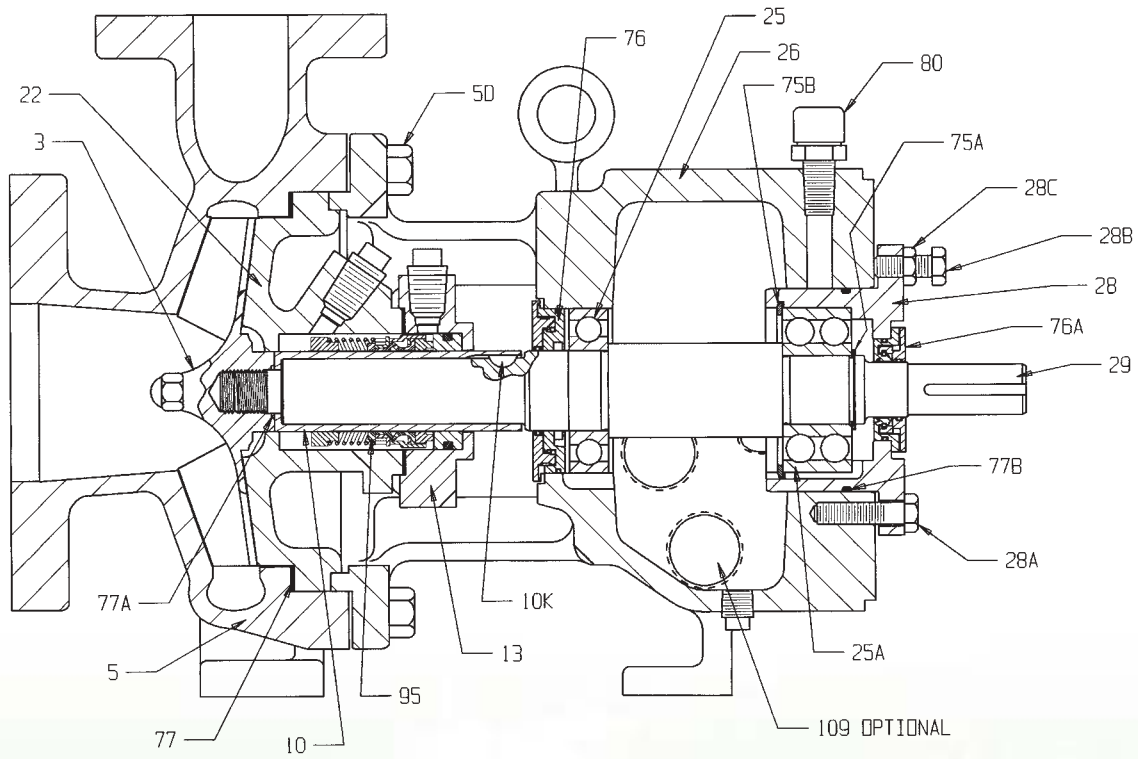
10. LUBRICATION OPTIONS
Oil bath lubrication is standard. Extra large oil reservoir designed for cooler bearing operation. Oil mist lubrication and grease lubrication are optional features. A finned tube oil cooler is also available (as an option) to directly cool oil for lower bearing temperature.

11. FILL PLUG
(pH2110 & pH2140 only)
Easy access to fill plugs supplied on both sides of the bearing housing. Designed to minimize the possibility of overfilling.

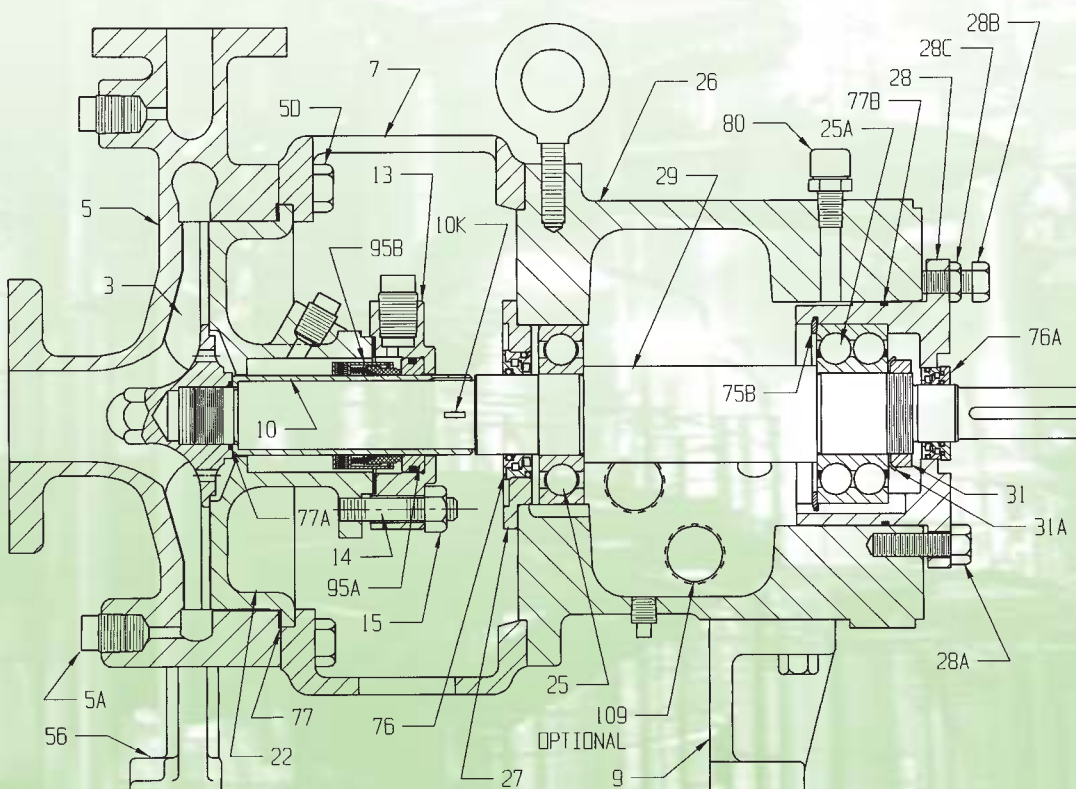
12. ONE INCH OIL SIGHT GLASS
(pH2110 & pH2140 only)
Allows for simple and easy monitoring of oil level and condition. Oil sight glass can be installed on either side of the bearing housing, in the field, for best location and ease of viewing. Combination automatic (bottle) oiler/sight glass also available.

13. RIGID BEARING HOUSING AND CASING FEET
Designed to reduce the effect of pipe loads on pump and shaft alignment.

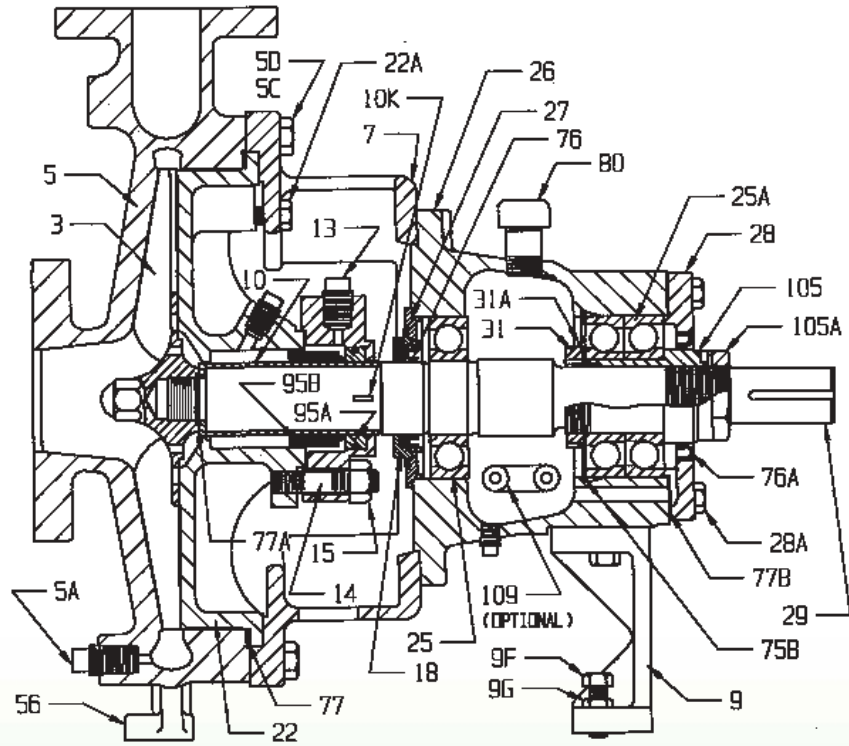
pH2110



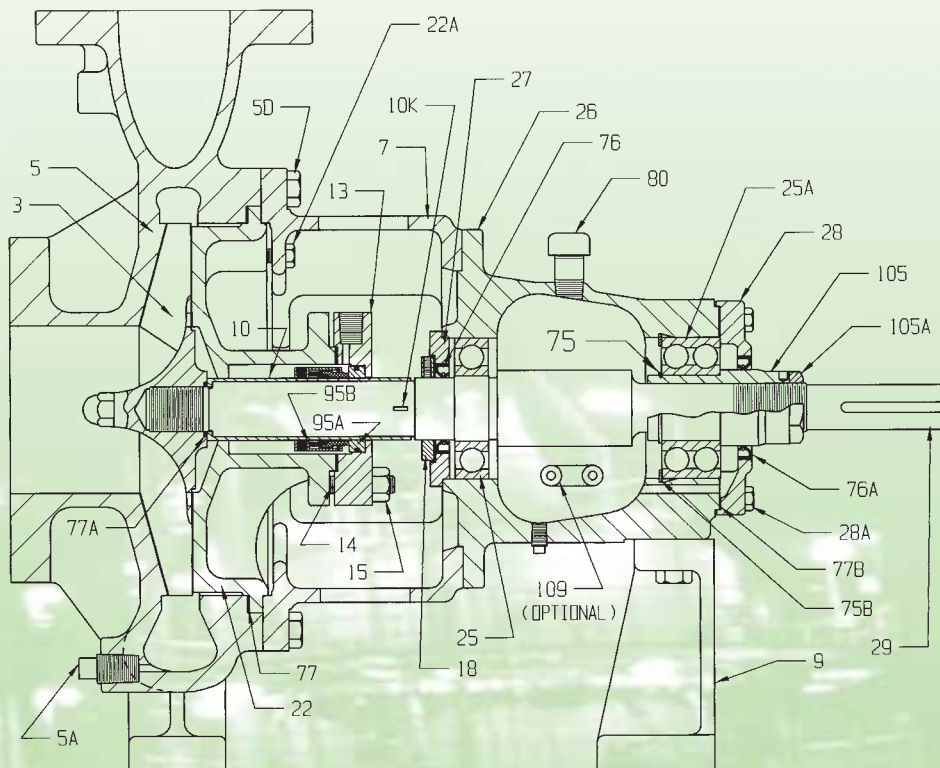
pH2140



pH240/pH340



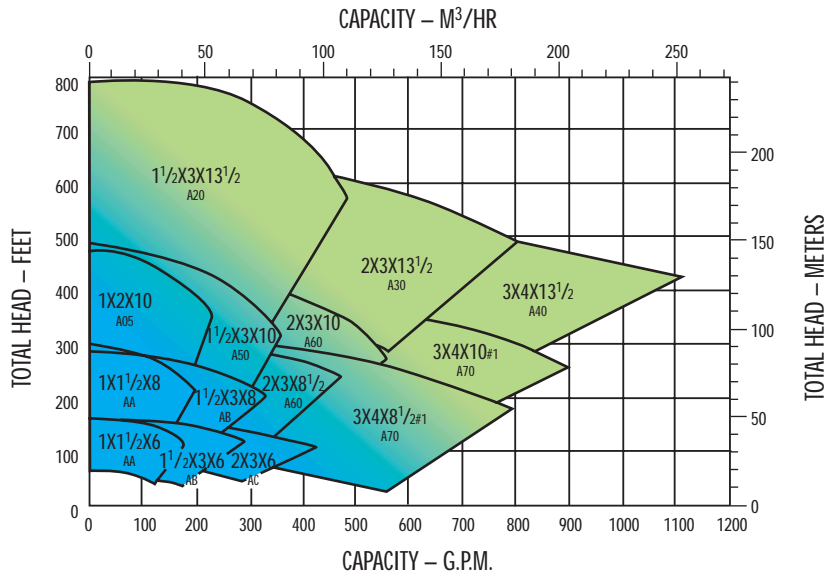
pH250



HEAD CAPACITY RANGE CHARTS

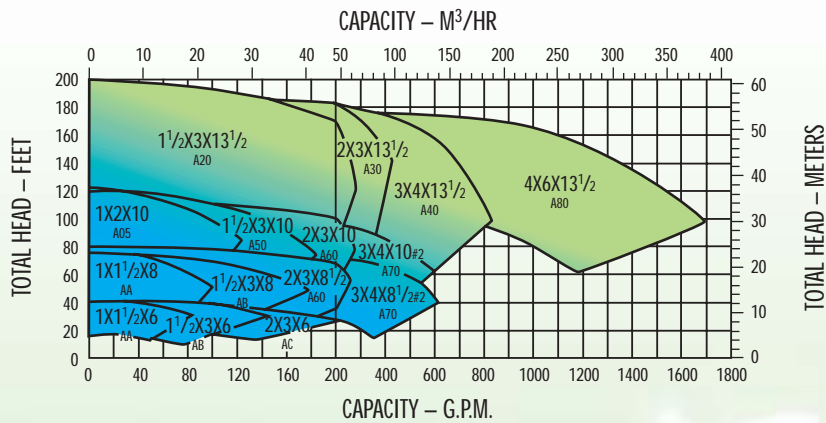
pH2110, pH2140 & pH340

3500 RPM



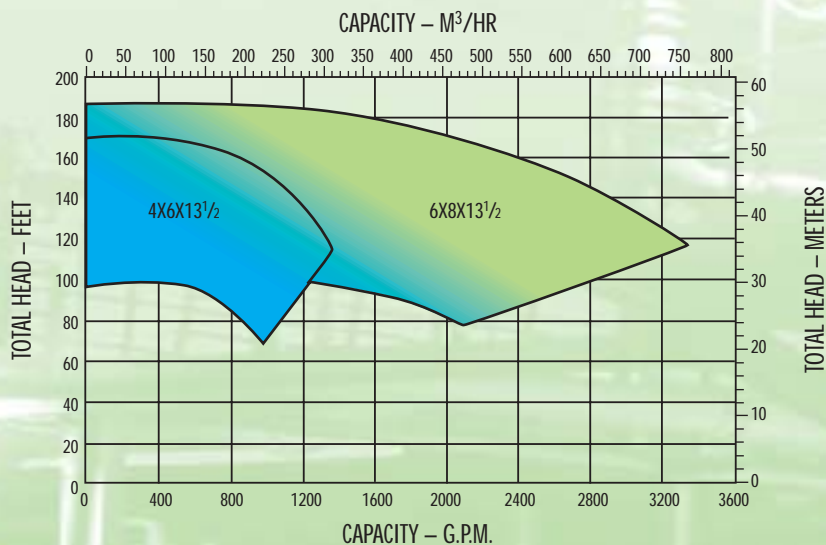
pH2110, pH2140 & pH240

1750 RPM



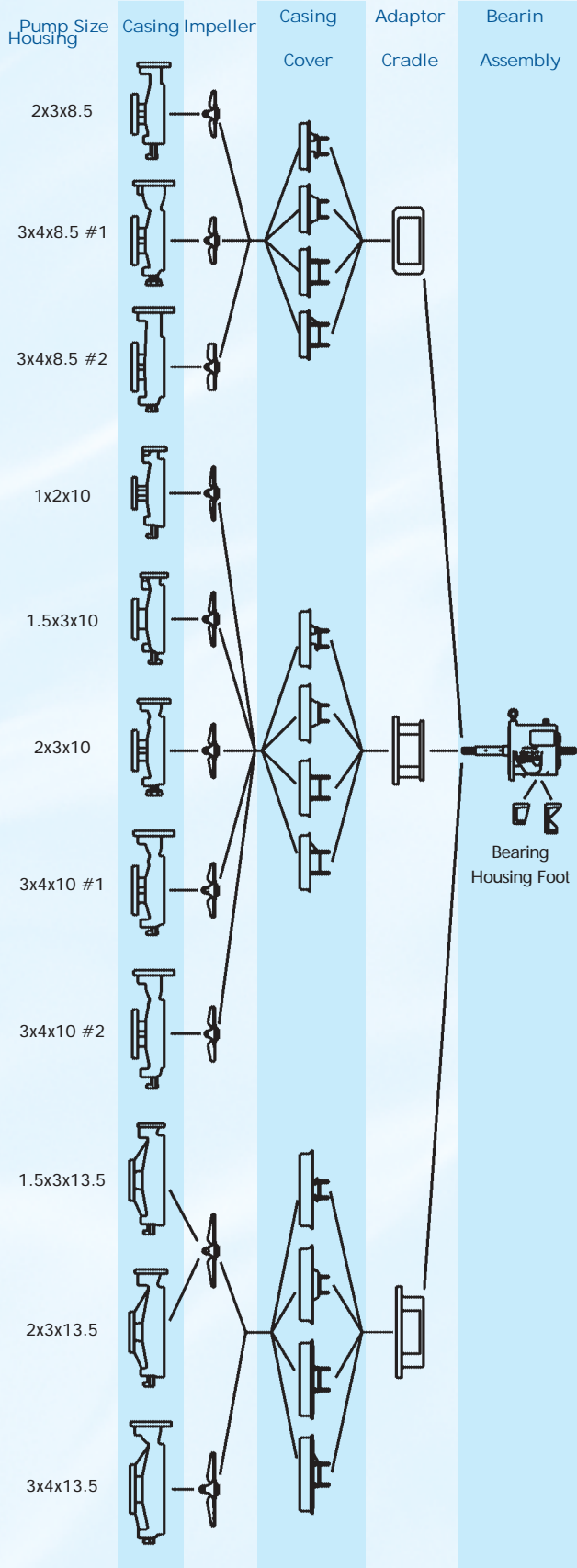
pH250

1750 RPM



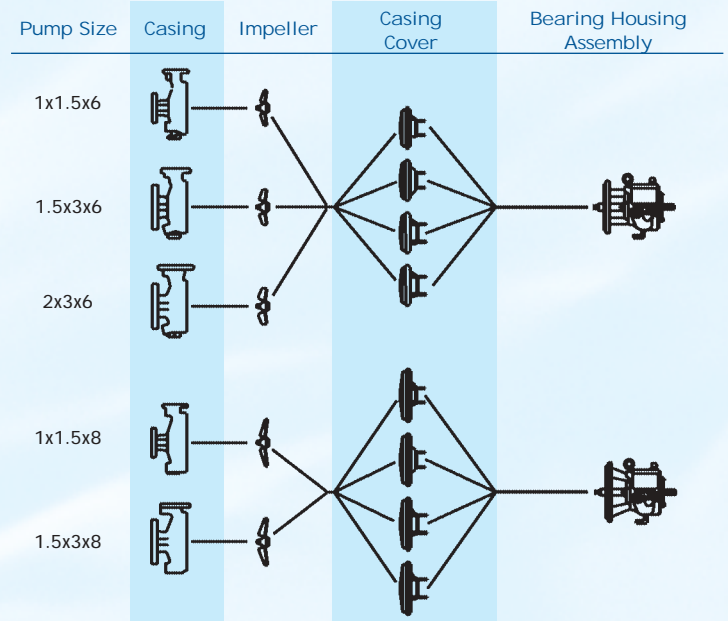
PARTS INTERCHANGEABILITY OF 22 PUMP SIZES

pH2140

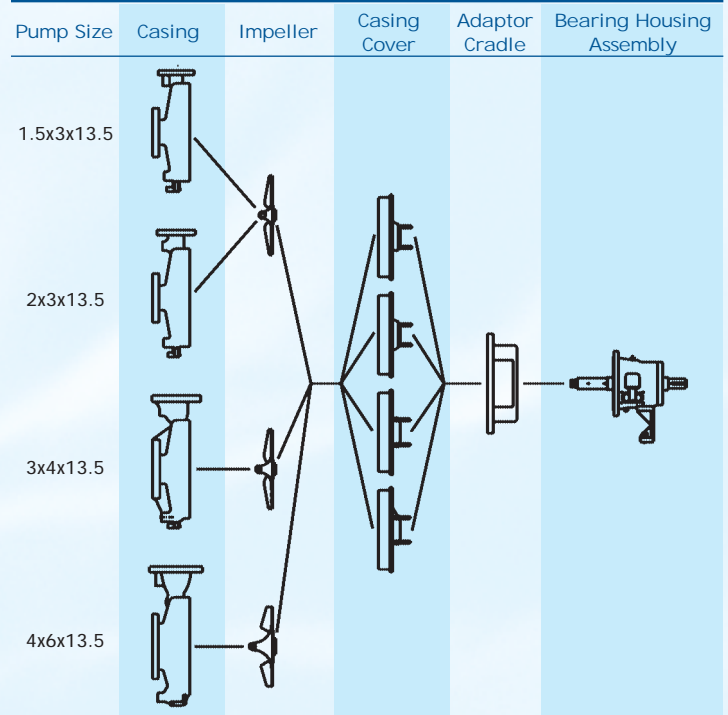


Casing covers with jackets, standard bore, large taper bore, and large cylindrical bore seal cavities are available on all pumps. Bearing housings with finned tube oil coolers are also available on all pumps.

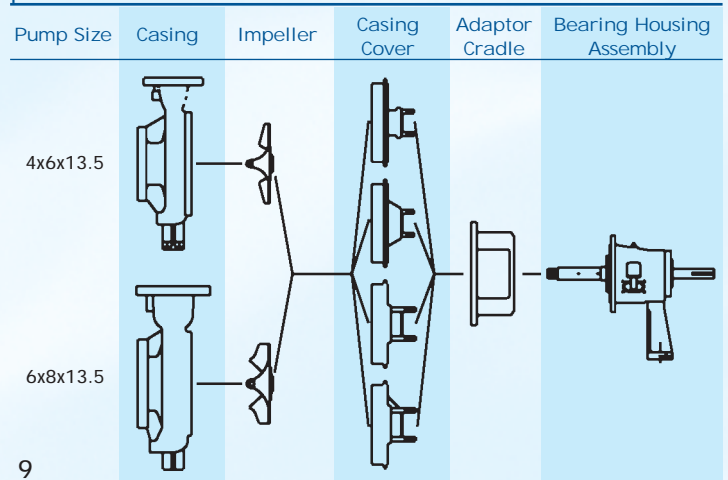
pH2110



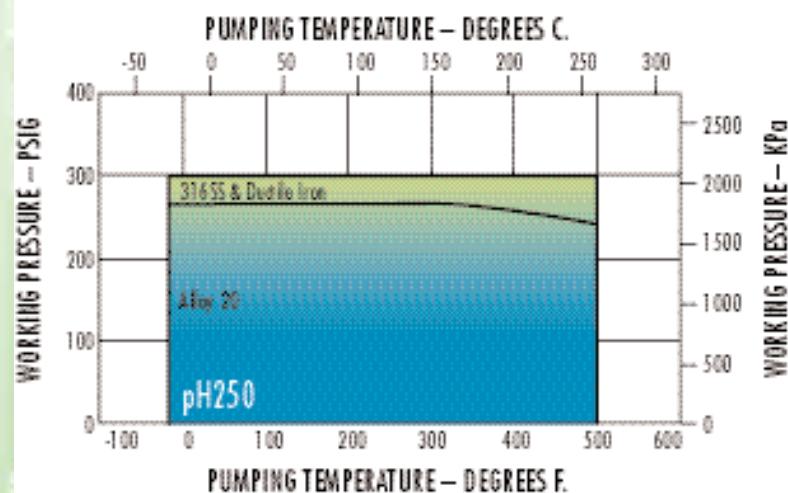
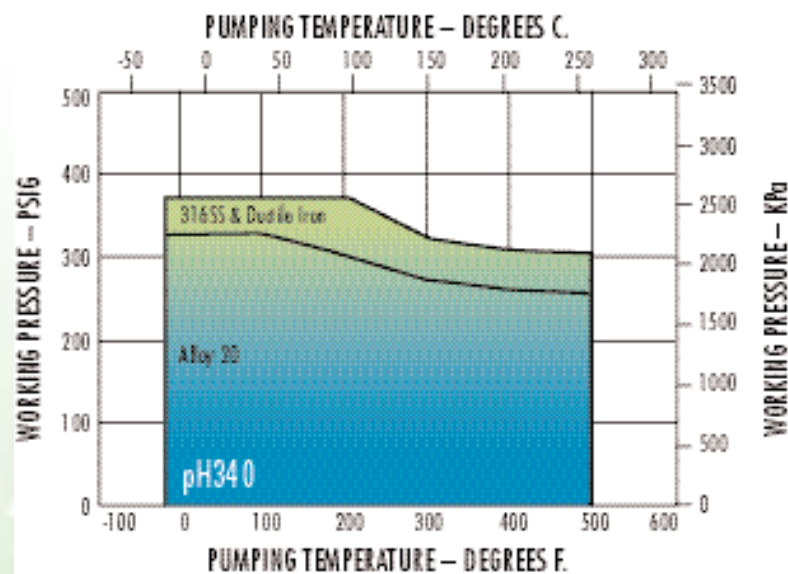
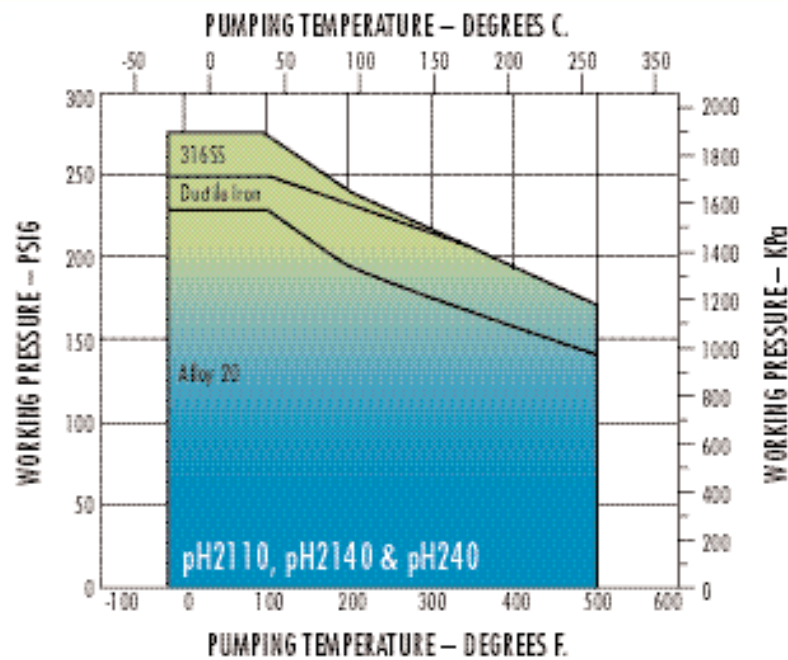
pH240/pH340



pH250



WORKING PRESSURE VS. TEMPERATURE

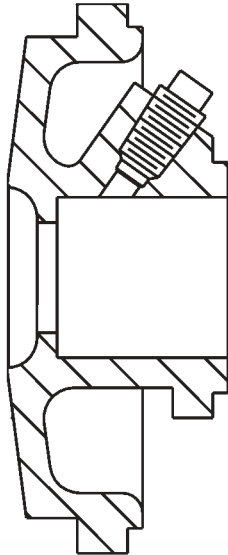


NOTE: For all Series pH pumps: lower temperature capabilities are available for special applications.

EXTENDED SEAL LIFE AND FLEXIBILITY

Dean Pump offers a variety of seal chambers specifically designed to provide optimum seal performance while best suiting a pump user's application and economic concerns.

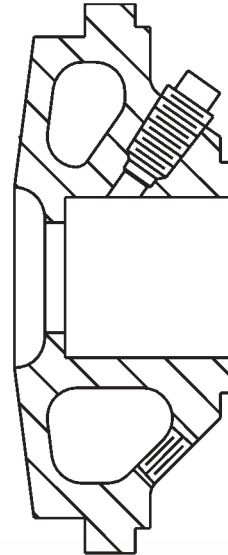
STANDARD BORE STUFFING BOX/SEAL CHAMBER



pH2111
pH2141
pH241
pH341
pH251

- Designed to accommodate either packing or various mechanical seal configurations.

STANDARD BORE JACKETED STUFFING BOX/SEAL



pH2112
pH2142
pH242
pH342
pH252

- Designed to improve heat transfer (heating or cooling) in the seal chamber area or across the entire surface area of the process fluid.
- Regarding material availability, jackets are constructed in the same material as the other pressure containing parts.

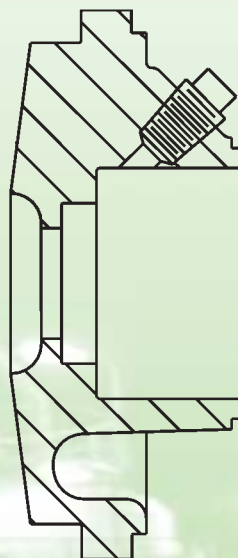
LARGE TAPER BORE SEAL CHAMBER



pH2116
pH2146
pH246
pH346
pH256

- Designed to circulate heat, solids, and vapor out of the seal chamber and away from the seal faces. This will result in lower seal face temperature, and consequently, longer seal life.
- Regarding material availability, taper bore seal chambers are constructed in the same material as other pressure containing parts.
- Often times, flushing is not required but it is available through a

LARGE CYLINDRICAL BORE SEAL CHAMBER

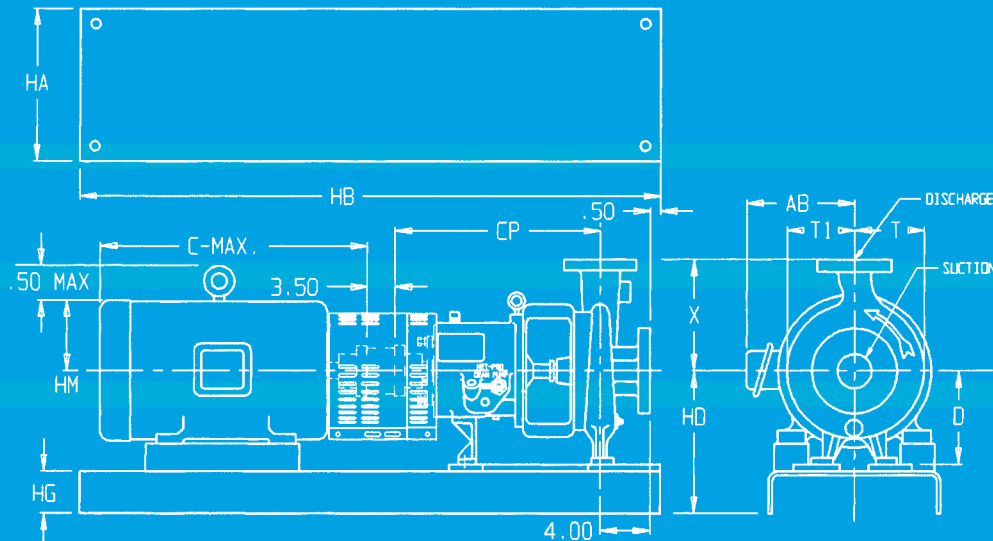


pH2116
pH2146
pH246
pH346
pH256

- Designed with an enlarged seal chamber area thereby resulting in an improved seal life and increased lubrication and cooling.

Dimensions with "Economy"

Baseplate



All Dimensions in inches.

ANSI Pump Size	Pump Size	Discharge					Suction					CP	D	X	T	T1
		Size	O.D.	Thick.	B.C.	Bolts	Size	O.D.	Thick.	B.C.	Bolts					
AA	1x1.5x6	1	4.25	.563	3.13	4-1/2	1.5	5	.688	3.88	4-1/2	13.5	5.25	6.50	5.00	5.00
	1x1.5x8	1	4.25	.563	3.13	4-1/2	1.5	5	.688	3.88	4-1/2	13.5	5.25	6.50	5.50	5.50
AB	1.5x3x6	1.5	5	.688	3.88	4-1/2	3	7.50	.938	6	4-5/8	13.5	5.25	6.50	5.00	5.00
	1.5x3x8	1.5	5	.688	3.88	4-1/2	3	7.50	.938	6	4-5/8	13.5	5.25	6.50	5.50	5.50
AC	2x3x6	2	6	.750	4.75	4-5/8	3	7.50	.938	6	4-5/8	13.5	5.25	7	5.25	5.00
A60	2x3x8.5	2	6	.750	4.75	4-5/8	3	7.50	.938	6	4-5/8	19.5	8.25	9.50	6.25	5.75
A70	3x4x8.5#1	3	7.50	.938	6	4-5/8	4	9	.938	7.50	8-5/8	19.5	8.25	11	7	6.13
	3x4x8.5#2	3	7.50	.938	6	4-5/8	4	9	.938	7.50	8-5/8	19.5	8.25	11	7.63	6.38
A05	1x2x10	1	4.25	.563	3.13	4-1/2	2	6	.750	4.75	4-5/8	19.5	8.25	8.50	5.75	5.75
A50	1.5x3x10	1.5	5	.688	3.88	4-1/2	3	7.50	.938	6	4-5/8	19.5	8.25	8.50	6.25	6.25
A60	2x3x10	2	6	.750	4.75	4-5/8	3	7.50	.938	6	4-5/8	19.5	8.25	9.50	6.75	6.25
A70	3x4x10#1	3	7.50	.938	6	4-5/8	4	9	.938	7.50	8-5/8	19.5	8.25	11	7.38	6.38
	3x4x10#2	3	7.50	.938	6	4-5/8	4	9	.938	7.50	8-5/8	19.5	10	11.75	8.50	7.38
A20	1.5x3x13.5	1.5	5	.688	3.88	4-1/2	3	7.50	.938	6	4-5/8	19.5	10	10.50	8.25	8.25
A30	2x3x13.5	2	6	.750	4.75	4-5/8	3	7.50	.938	6	4-5/8	19.5	10	11.50	8.75	8.25
A40	3x4x13.5	3	7.50	.938	6	4-5/8	4	9	.938	7.50	8-5/8	19.5	10	12.50	9.38	8.50

Frame	C	AB	CP=13.5			CP=19.5			HD			HM
			HA	HB	HG	HA	HB	HG	D=5.25	D=8.25	D=10	
140T	13.75	6.50	10	35	3	12	45	3.75	8.25	12	13.75	3.88
182T	14.63	7.50	10	35	3	12	45	3.75	8.25	12	13.75	5.25
184T	15.63	7.50	12	39	3.25	12	45	3.75	8.50	12	13.75	5.25
210T	19.63	9.50	12	39	3.25	12	45	3.75	8.50	12	13.75	6
250T	24.88	11.00	15	52	4.13	15	52	4.13	10.38	12.38	14.13	7
280T	28.38	12.63	--	--	--	15	52	4.13	--	12.38	14.13	7.75
280TS	27.00	12.63	15	52	4.13	15	52	4.13	11.13	12.38	14.13	7.75
324TS	28.38	14.75	12	45	3.75	18	58	4.75	13.75	13	14.75	8.75
320T	31.38	14.75	--	--	--	18	58	4.75	--	13	14.75	8.75
326TS	29.88	14.75	--	--	--	18	58	4.75	--	13	14.75	8.75
364T	33.13	16.25	--	--	--	18	58	4.75	--	13.75	14.75	9.88
360TS	32.50	16.25	--	--	--	18	58	4.75	--	13.75	14.75	9.88
405TS	35.50	20.25	--	--	--	26	68	4.75	--	14.88	14.88	11



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