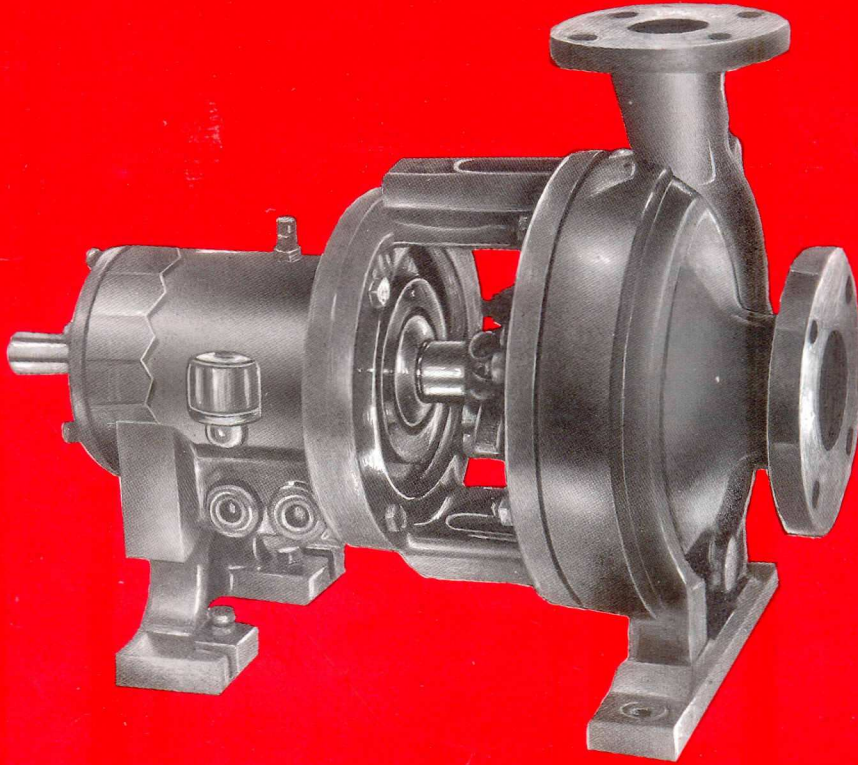


**SERIES 5000**  
***ANSI***  
**CHEMICAL PUMP**



- **FULLY CONFORMS TO ANSI B 73.1**
- **BACK PULL OUT CONSTRUCTION**
- **SEMI OPEN IMPELLER TO SUIT ANY CORROSIVE LIQUID AND SLURRY APPLICATION**
- **CAPACITIES TO 700 M<sup>3</sup>/HR, HEADS TO 225 m. TEMP.: 260<sup>o</sup>C**
- **MAXIMUM INTERCHANGEABILITY - 37 MODELS IN FOUR SHAFT SIZES**
- **ALL CASTINGS ONLY FROM ISO - 9002 FOUNDRY**
- **AFTER SALES SERVICE BACKED UP BY EX-STOCK DELIVERY OF SPARES**
- **QUALITY, RELIABILITY FOR HIGH PERFORMANCE**

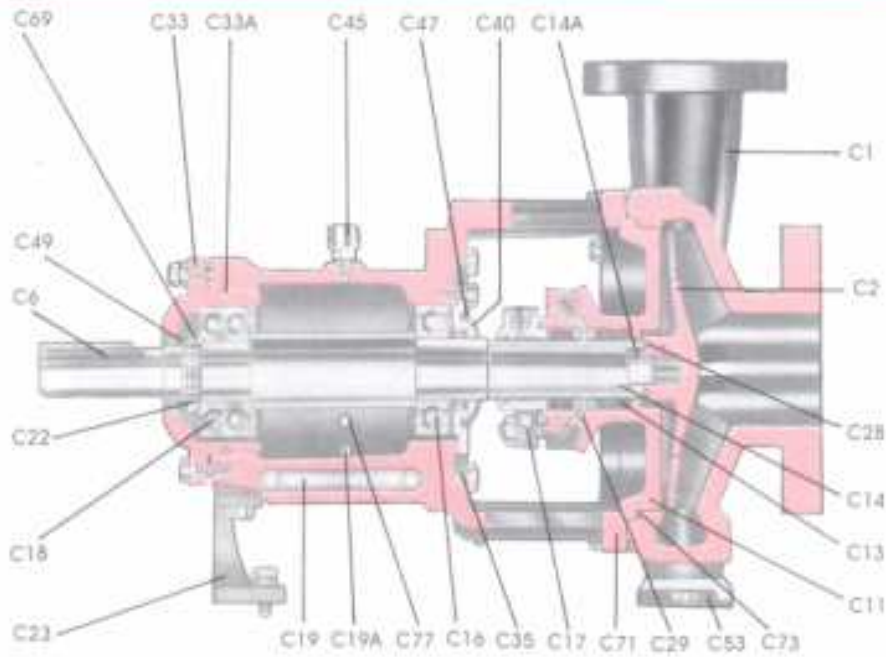
**C. P. V. ENGINEER PVT. LTD., HUBLI.**

## DESIGN FEATURES

Component	Feature	Benefit
CASING	Extra Corrosion Allowance Heavy duty design Top centerline	Wall thickness more. Better resistance to pipe loads Class 150 or 300 flanges. Self Venting.
IMPELLER	Fully open design Back pump out vanes Balancing Impeller seal ring	Wear area much more than closed impeller. Reduces stuffing box pressure. For extended bearing life, less vibrations. Protects threads against corrosion.
SEAL CHAMBER	Enlarged bores	Improve lubrication and cooling of seal faces. Accommodate any type seal.
BEARING FRAME	large oil sump Standard water Jacket Frame Foot  Frame Adapter Constant level oilier	Bearings run cooler, last longer. Additional cooling for Temp. Above 90°C. Rigid design to reduce effects on pipe loads on pump motor alignment. For softy and strength. Visible oil level from distance.
SHAFT	Optimum overhang Vs diameter  Hook type sleeve	low deflection 0.05 mm at seal faces for longer seal and bearing life. Accommodates balanced seals. PTEE seal ring prevents leakage under sleeve.
BEARINGS	Optimized size and configuration	Provides extended life exceeding 2 years.
BASE PLATE	Drip rim type, Rigid CI base plates	Most rigid base plate ensures negligible misalignment and longer life of shaft, bearings, mech. seals.

## CHEMICAL COMPOSITION OF COMMON MATERIALS

Material	Specification	C%	Mn%	Si%	P%	S%	Cr%	Ni%	Mo%	Cu%
		Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.
Cast Iron	IS 21 0 - FG 200				0.25	0.10				
Cast Steel	ASTM A 216 GRWCB	0.30	1.0	0.60	0.040	0.045				
SS 304	ASTM A 743 GR CF 8	0.08	1.5	2.0	0.040	0.040	18/21	8/11	0.5	
SS 316	ASTM A 743 GR CF 8M	0.08	1.5	2.0	0.040	0.040	18/21	9/12	2/3	
Alloy - 20	ASTM A 743 GR CN 7 M	0.07	1.5	1.5	0.040	0.040	19/22	27.5/ 30.5	2/3	3/4
CD 4 MCu	ASTM A 743	0.04	1.0	1.0	0.040	0.040	24/26	4.75/6	1.75/2.25	2.75/ 3.75
Hastalloy - B	ASTM A 494 GR N 12 MV	0.12	1.0	1.0	0.040	0.030	1.0	BAL	26/30	
Hastalloy - C	ASTM A494 GR CW 12 MW	0.12	1.0	1.0	0.040	0.030	15.5/ 17.5	BAL	16/18	

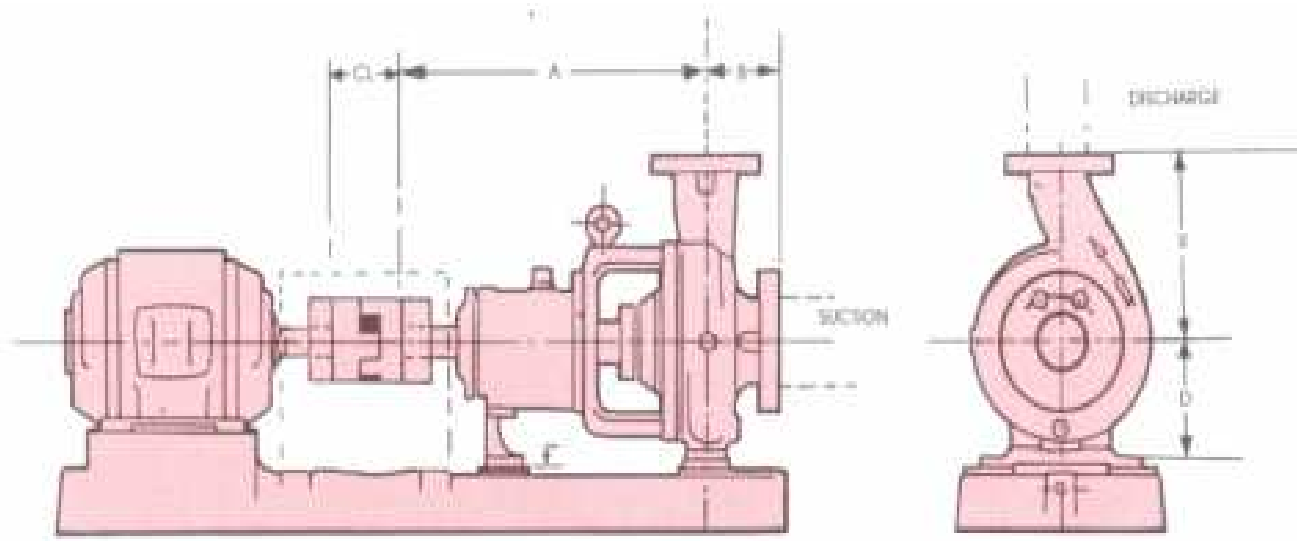


## PART LIST AND MATERIAL OF CONSTRUCTION

Part No	Part Name	Cast Iron	Cast Steel	SS316	SS 304	CD4MCu	Alloy-20	Hastalloy B&C
C1	Casing	Cast Iron	Cast Steel	SS 316	SS 304	CD4MCu	Alloy-20	Hastalloy
C2	Impeller	Cast Iron	Cast Steel	SS 316	SS 304	CD4MCu	Alloy-20	Hastalloy
C6	Shaft	SAE-4140		SS 316				
C11	Stuffing Box Cover	Cast Iron	Cast Steel	SS 316	SS 304	CD4MCu	Alloy-20	Hastalloy
C13	Stuffing Box Packing	TIWA			PTFE			
C14	Shaft Sleeve	420		SS 316	SS 316	CD4MCu	Alloy-20	Hastalloy
C14A	Drive Pin	420						
C16	Bearing Inboard	Steel						
C17	Gland Quench	SS 316			Alloy-20		Hastalloy	
C17A	Gland Packing	TIWA						
C18	Bearing Outboard	Steel						
C18A	Retaining Ring	Steel						
C19	Bearing Frame	CAST IRON						
C19A	Bearing Oil Drain Plug	Steel						
C22	Bearing Lock Nut	Steel						
C23	Bearing Frame Foot	CAST IRON						
C28	Impeller Seal Ring	PTFE						
C29	Lantern Ring	Glass Filled PTFE						
C33	Bearing Housing	CAST IRON						
C33A	O-ring	Buna Rubber						
C35	Bearing Cover Inboard	CAST IRON						
C35A	Gasket - Bearing Cover IB	Asbestos						
C37	Bearing Cover - OB	CAST IRON						
C37A	Gasket - Bearing Cover - OB	Asbestos						
C38	Shaft Sleeve Gasket	Asbestos						
C40	Deflector	SS 304						
C45	Breather	STEEL						
C46	Key - Coupling	Steel						
C47	Oil Seal-IB	Buna Rubber						
C49	Oil Seal- OB	Buna Rubber						
C53	Casing Foot	CAST IRON						
C69	Bearing Lock Washer	Steel						
C71	Frame Adapter	CAST IRON						
C73	Casing Gasket	Asbestos or PTFE						
C77	Constant Level Oilier	PLASTIC / AL						

## DIMENSIONS SERIES 5000

TYPE	MODEL	SUCTION SIZE	DISCHARGE SIZE	IMPELLER SIZE	X	D	A	B	CL	BARE PUMP WEIGHT
		IN INCHES				IN MM				
A	A /25/175	1	1	7	165	132	345	100	90	43
	A /25X/175	1.5	1							45
	A /40 /175	3	1.5							50
	A /50/175	3	2							52
AT	AT /25/150	1.5	1	6	165	132	345	100	90	43
	AT /40/150	3	1.5							46
	AT /50/150	3	2							48
	AT /25/200	1.5	1							50
	AT /40/200	3	1.5							54
BT	BT /25/225	2	1	9	215	210	500	100	90	90
	BT /40/225	3	1.5		215	210				99
	BT /50 /225	3	2		240	210				102
	BT /80/225	4	3		280	210				116
	BT /100/225	6	4		315	255				136
	BT /25/265	2	1	10.5	215	210				103
	BT /40/265	3	1.5		215	210				111
	BT /50/265	3	2		240	210				117
	BT /80/265	4	3		280	210				129
	BT /100/265	6	4		315	255				151
	BT /40/300	3	1.5	12	265	255				123
	BT /50/300	3	2		290	255				132
	BT/80 /300	4	3		315	255				144
	BT /100 /300	6	4		345	255				168
CT	CT /80/300 L	4	3	12	315	280	700	150	135	185
	CT / 100 / 300 L	6	4		345	280				205
	CT / 150 / 300 L	8	6		370	315				234
	CT / 150 / 300 LH	8	6		405	315				246
	CT /80/350	4	3	14	345	280				240
	CT /100/350	6	4		370	280				268
	CT /150/350	8	6		405	370				300
	CT /150/350 H	8	6		405	370				306
	CT /200/350	10	8		460	370				335
	CT /80/400	4	3	16	405	315				278
	CT /100/400	6	4		405	315				310
	CT /150/400	8	6		460	370				353
	CT /150/400 H	8	6		460	370				357
CT /200/400	10	8	505		370	392				



## DESIGN DETAILS

			A	AT	BT	CT
SHAFT	Diameter at Impeller	mm	22	20	33	56
	Diameter under Sleeve	mm	22.2	28.58	38	51
	Diameter Between Bearings	mm	34	34	53	79
	Diameter at Coupling	mm	22	22	28	60
SLEEVE	O.D. thru Seal Chamber	mm	28.58	34.93	44.45	63.5
BEARINGS	Radial-IB		SKF-6306	SKF-6306	SKF-6309	SKF-6313
	Thrust - OB		SKF-3305	SKF-3305	SKF-3309	SKF-3313
	Bearing Span	mm	115	115	171	237
STFFING BOX	Bore	mm	44	51	63	85
TEMP. MAX.	With Cooling		260°C	260°C	260°C	260°C
CASING	Corrosion Allowance	mm	3	3	3	3
POWER LIMITS	At 1450 RPM	kw	7.5	12	37	150
	At 2900 RPM	kw	15	24	75	304

# IMPORTANCE OF NPSH TO THE CHEMICAL PUMP USER

Net Positive Suction Head is one of the most important factors in the selection and design of chemical pumps; yet it is often confusing to engineers. Many times the problems of erosion, reduced capacity, shortened bearing life, and shortened packing or mechanical seal life can be directly related to insufficient NPSH. The following brief discussion provides answers to questions that often arise regarding NPSH.

## AVAILABLE NPSH

Briefly, available NPSH is the absolute pressure available at the suction nozzle of the pump. It is the amount of pressure on the surface of the liquid in the suction tank, plus the liquid head minus the vapor pressure of the liquid at the pumping temperature, and minus the pressure lost through friction in moving the liquid to the suction flange of the pump. Since pressures or vacuums are frequently present at the suction tank, and since fluids seldom have a specific gravity of 1.0 all calculations must be converted to standard units.

Available NPSH can be expressed by the following equation where all terms are in meter of liquid absolute:

Available NPSH =  $H_a - H_{vpa} - H_f + H_s$ ,  $H_a$  = Absolute pressure on surface of liquid in suction tank. (If atmospheric pressure is in meter of water, be sure to convert to meter of liquid by dividing by the specific gravity.)  $H_{vpa}$  = Vapour pressure of liquid at pumping temperature. (Be sure your terms are in meter of liquids; not water.)  $H_f$  = Total friction and turbulence losses in the piping and system from suction tank to pump suction flange in meter of liquid.  $H_s$  = Height of liquid in suction tank above or below pump center line.

## REQUIRED NPSH

Required NPSH is the amount of absolute pressure at the suction nozzle of the pump required by the pump to perform satisfactorily. The pressure required overcoming the internal friction losses in the pump, plus the head necessary to prevent vaporization in the pump, plus the "velocity head" necessary to maintain flow through the pump determine the required NPSH.

Required NPSH cannot be calculated, but is entirely dependent on pump design. CPV series 5000 pump is designed for low required NPSH because the losses described above are kept to a minimum.

**Calculations of Power Consumption:** = Refer duty point from Performance curves

$$\text{BKW (Water)} = \frac{Q \text{ (m}^3 \text{ / h)} \times H \text{ (m)}}{3.67 \times \text{Efficiency (\%)}}$$
$$\text{BKW (Liquid)} = \text{BKW (Water)} \times \text{Sp, gr. (Liq)}$$

For Viscous liquids Refer viscosity correction charts and note correction factors KH for Head, KQ for Capacity and KEFF for efficiency. Convert capacity and head given for liquid to that of water by dividing by KH and KQ. Then calculate BKW water from above formula.

$$\text{BKW (Water)} = \frac{\text{BKW (Water)} \times \text{Sp, gr.} \times \text{KH} \times \text{KQ}}{\text{KEFE}}$$

### Useful Information:

Conversion: 1 Atmosphere	= 760.0 mm of Hg
	= 101.3 Kpa
	= 33.9 Ft of water column
	= 29.9 Inches of Hg
	= 14.7 Psi
	= 10.0 m of water column
1 Kg / cm <sup>2</sup>	= 98.0 Kpa
1 Gpm (UK)	= 0.270 Cubic m/hr
1 Gpm (US)	= 0.227 Cubic m/hr

# CORROSION RESISTANT ALLOY

KEY	Fluid	SS 304	SS 316	ALLOY - 20	HASTALLOY - C	HASTALLOY - B
	Acetic Acid	3	2	1	1	1
	Hydrochloric Acid	5	5	5	5	5
	Ammonium Nitrate	1	1	1	1	1
	Hydrogen Peroxide	2	2	2	3	2
	Aluminum Sulphate (Alum) 5%	2	1	1	1	1
	10%	3	1	1	1	1
	Saturated	5	1	1	1	1
	Magnesium Chloride ( Brine)	5	5	[4]	1	[3]
	Magnesium Sulphate ( Epsom Salt)	2	1	1	1	1
	Calcium Chloride ( Brine)	5	5	4	1	3
	Calcium Hypochlorite ( Bleach Liquor )	5	5	5	3	5
	Spin Bath Solution	5	5	3	1	1
	Nitric Acid 5%	1	1	1	3	1
	20%	1	1	1	3	1
	40%	1	1	1	3	1
	50%	1	1	1	3	1
	65%	2	1	2	2	2
	100%	4	4	3	5	3
	Ethylene Glycol	2	1	1	1	1
	Phosphoric Acid 5%	1	1	1	1	1
	10%	1	1	1	1	1
	25%	2	1	1	1	1
	50%	2	1	1	1	1
	85%	3	2	2	2	2
	Potassium Sulphate	3	2	1	1	1
	Soda Ash ( Sodium Carbonate)	2	1	1	1	1
	Sodium Chloride ( Brine)	[3]	[2]	[1]	1	[1]
	Sodium Hydroxide < 20%	1	1	1	1	1
	( Caustic Soda) 20 - 30%	2	2	1	1	1
	30 - 50%	2	2	1	1	1
	50 - 70%	5	5	b	1	b
	70 - 80%	5	5	b	1	b
	Sulphuric Acid 5 - 10%	4	3	2	1	2
	10 - 20%	5	3	2	1	2
	20 - 40%	5	5	2	2	2
	40 - 60%	5	5	3	2	2
	60 - 75%	5	5	3	2	2
	75 - 85%	5	5	3	2	2
	85 - 90%	4	3	2	2	2
	90 - 100%	3	2	a	a	a
	Zinc Chloride	5	[3]	[2]	[2]	[2]
	Zinc Sulphate ( White Vitriol)	4	2	1	1	1

## RANGE OF COVERAGE

TYPE A	Capacity - to 70 m <sup>3</sup> /hr	TYPE BT	Capacity - to 250 m <sup>3</sup> /hr
	HEAD - to 45 m		HEAD - to 150 m
	Temperature - to 260°C		Temperature - to 260°C
TYPE AT	Capacity - to 85 m <sup>3</sup> /hr	TYPE CT	Capacity - to 750 m <sup>3</sup> /hr
	HEAD - to 62 m		HEAD - to 250 m
	Temperature - to 260°C		Temperature - to 260°C

## WORKING PRESSURE

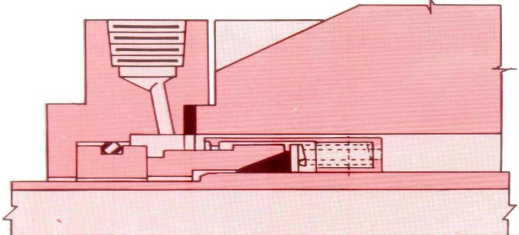
Pressure Class	Material	Casing	Stuffing Box Cover
Class 150	CI	12Kg / cm <sup>2</sup>	30 Kg / cm <sup>2</sup>
	ALLOY	20Kg / cm <sup>2</sup>	
Class 300	CI	18 Kg / cm <sup>2</sup>	
	ALLOY	30 Kg / cm <sup>2</sup>	

HYDROTEST AT 1.5 TIMES OF WORKING PRESSURE.

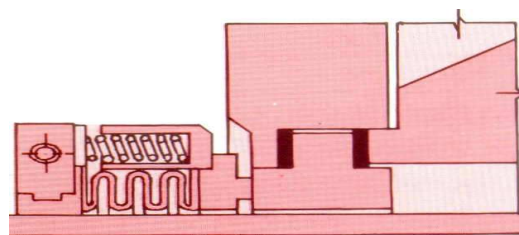
### Fully Jacketed Pump

The pump can be supplied with Steam Jacketed Casing for handling liquids which solidify at ambient or above ambient temperatures. The jacketed casing is normally used with the jacketed stuffing box cover to provide a completely heated liquid end.

- MECHANICAL SEALS OF ANY REPUTED MAKE LIKE EAGLE - BURGMAN / FLOWSERVE / JOHN CRANE / LEAKPROOF / HI-FAB, CAN BE INSTALLED ON CPV SERIES 5000 PUMP.



INSIDE BALANCED SEAL



OUTSIDE PTFE BELLOWS SEAL FOR ACID SERVICE

Manufacturing Plant:

### C. P. V. ENGINEER PVT.LTD., HUBLI

N-27, Industrial Estate, 1 st Main, Gokul Road,  
HUBLI - 580 030 ( Karnataka ) INDIA

**Phones:** +91- 836-2331039 / 3293934. **Fax:** +91-836-2331038

**Mob:** +91-9343105739.

**E-Mail:** [cpvengr@gmail.com](mailto:cpvengr@gmail.com) / [cpvengr@rediffmail.com](mailto:cpvengr@rediffmail.com) / [cpvengr@dataone.in](mailto:cpvengr@dataone.in)

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