OBERDORFER®

An Ingersoll Rand Business

STAINLESS STEEL AND ALLOY C PUMPS
FOR DEMANDING APPLICATIONS

Chemsteel®

www.oberdorferpumps.com

Why Professionals Choose Oberdorfer Chemsteel Series Pumps

OPTIONAL BEARING FLUSH PORTS

- To extend bearing life when pumping non-lubricating fluids or fluids with a small degree of fine solids

EXTENDED LIFE

- Gear & bearing combinations of metallic and non-metallic wear surfaces
- Slotted bearings to lubricate shaft and gear surfaces
- Hydraulic porting to balance axial thrust

BI-DIRECTIONAL OPERATION

- For applications requiring r eversing flow

COMBINED BEARING AND WEARPLATE

- Full size bearings match the gear diameter and eliminate the need for separate wear plates
- Gear trimming for temperature compensation
- Made of carbon-graphite, PTFE or Rulon ®

HELICAL GEARS

- Noise reduction up to 10 db

INTERFACING TO WORLD STANDARDS

- NPT and BSPT porting
- Metric pump hardware
- Close-coupled adapters for NEMA and IEC standard motor frame sizes

METALLIC

- Wide Range of capability
- Effective weight and cost selection

SEAL HOUSINGS

- Ported for flush, drain, barrier fluid
- Access to seals without removal of cover

BODY/COVER STATIC O-RINGS

- PTFE encapsulating silicone for sealing with a memory

UPPER DRIVE STANDARD

- Lends itself to in-line pump seal maintenance without leakage of trapped chemicals
- Easily converted to a lower drive configuration

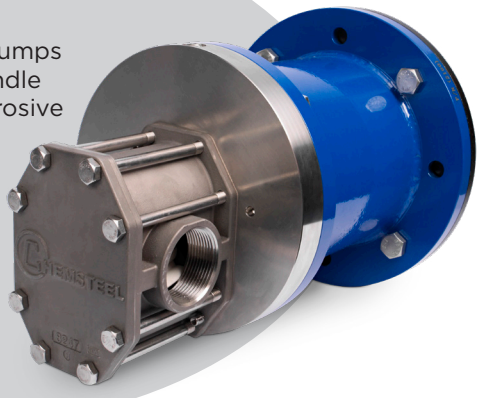
DYNAMIC SEAL OPTIONS

- Single or double mechanical wedge and bellows styles
- Lip seals

MAG DRIVE PUMPS

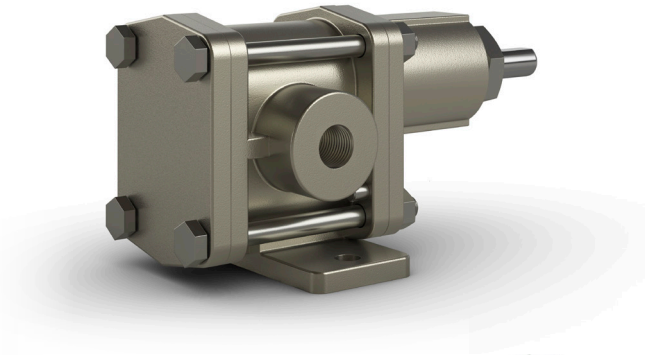
Chemsteel Magnetic Gear Pumps are engineered to safely handle hazardous, toxic, highly corrosive or explosive chemicals.

- STAINLESS STEEL
- ALLOY C



Construction

BODY
- 316 Stainless Steel—an all purpose austenitic stainless, excellent corrosion resistance; premium choice of all 300 series alloys.
- Alloy C—Superior corrosion resistance for severe alkaline and acidic pumping applications



GEARS
- Precision machined metallic gears of 316SS, W88 stainless, and Alloy C. Also available in PTFE, PPS and carbon reinforced PEEK.

SHAFTS
- Shafts are 316 stainless steel or Alloy C.

BEARINGS
- Full gear diameter carbon sleeve bearings for maximum chemical resistance and high load capacity. PTFE or Rulon® plastic bearings available for product purity.

SEALS
- Single and/or double mechanical seals are offered in elastomer bellows and PTFE wedge designs. Bellows design available with Viton® or EPDM formed elastomer shaft seal. Wedge designs available with PTFE wedge shaft seal and perfluoroelastomer stationary seat o-rings.

BODY/COVER O-RINGS
- PTFE encapsulating, silicone o-rings provide elastic memory to assure an effective long lasting seal avoiding the re-torquing required of pumps using pure TFE.

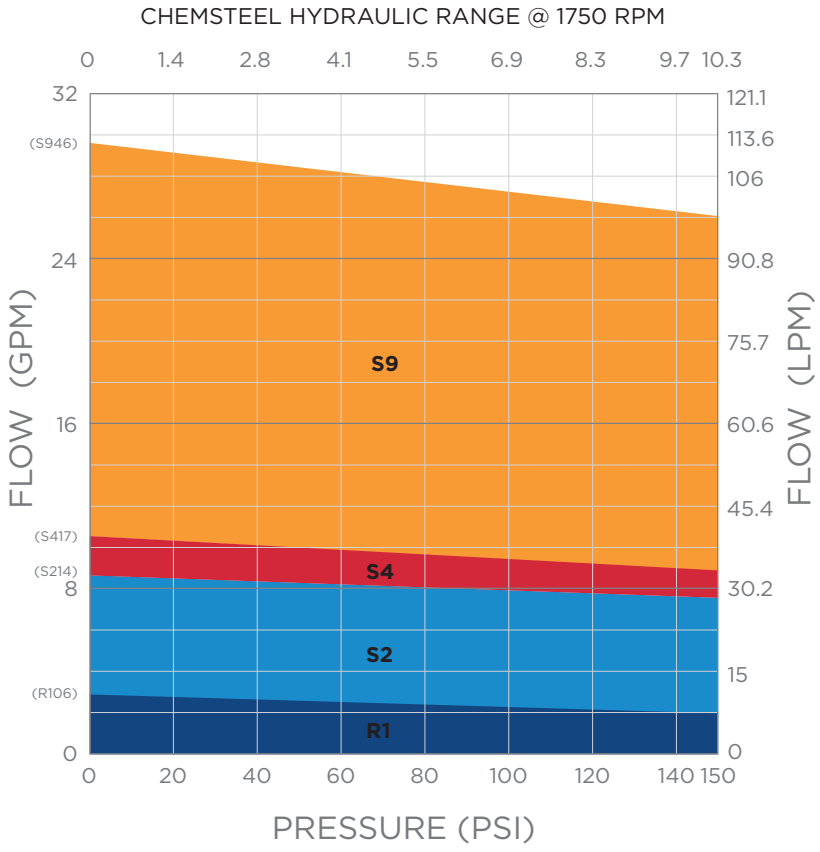
CLOSE-COUPLED MAG DRIVE PUMPS
- Body 316 SS and Alloy C constructions
- Gears PPS, Peek, 316 SS, W88, Alloy C and PTFE
- Shafts 316 SS or Alloy C
- Bearings Carbon, PTFE and Rulon®
- Samarium cobalt magnets
- Close-Coupled Adapters for NEMA and IEC standard motor frame sizes
- 316 Stainless Steel, and Alloy C containment cans
- 1/2 to 30 GPM (114 LPM | 6.8 m^3/h)

Chemsteel Series Overview

FAMILY	MAX FLOW (GPM)	BODY MATERIALS	SEAL TYPES	GEAR OPTIONS
R1	3	Stainless Steel, Hastelloy C	Mechanical, double lip	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE
S2	8	Stainless Steel, Hastelloy C	Mechanical, double lip	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE
S4	10	Stainless Steel, Hastelloy C	Mechanical, double lip	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE
S9	30	Stainless Steel, Hastelloy C	Mechanical, double lip	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE
RM1	3	Stainless Steel, Hastelloy C	Mag drive	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE
SM2	8	Stainless Steel, Hastelloy C	Mag drive	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE
SM4	10	Stainless Steel, Hastelloy C	Mag drive	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE
SM9	30	Stainless Steel, Hastelloy C	Mag drive	Stainless Steel, Hastelloy C, PPS, PEEK, W88, PTFE

Chemsteel Features

- Rugged, reliable pumps to meet your most demanding applications
- Wide range of gear and bearing materials to fit your application
- Flows from 0.5 to 30 GPM (1.9 to 114 LPM) at 1750 RPM
- Standard Pump Pressures to 150 PSI (10.3 bar)
- MAG Drive Pump Pressures to 110 PSI (7.6 bar)
- Slotted bearings to lubricate shaft and gear surfaces
- Effective housing seals with elastic memory prevent leakage of corrosives



Chemsteel® Numbering System

Example: S20716CCB

S2 07 1 6 C C B

- **B** — Additional Options (Tandem, BSPT threads, Lower shaft, etc.)
- **C** — Shaft Seal Style, Materials
- **C** — Bearing Material Carbon Graphite
- **6** — Gear Material Combination W88
- **1** — Housing and Shaft Material 316 SS
- **07** — Flow Rate 07 (4 gpm @ 1725)
- **S2** — Basic Pump Series S2

1. Basic Pump Series

SEAL-LESS MAG DRIVE		SEALED	Flow Rate Code	Max Flow (0 PSI / 0 bar) @ 1725 RPM	
Code	Metal	Code		GPM	LPM
RM1	X	R1	02	.5	1.9
	X		03	1.5	5.7
	X		04	2	7.6
	X		06	3	11.4
SM2	X		07	4	15.1
	X	S2	10	5.6	21.2
	X		14	8	30.3
SM4	X	S4	17	10	37.9
SM9	X		23	15	56.8
	X		30	20	75.7
	X		35	23	87.1
	X		46	30	113.6

2. Housing and Shaft Material

Code	Housing Material	Shaft Material
1	316 Stainless Steel	316 Stainless Steel
3	Alloy C	Alloy C

Teflon® is a registered trademark of DuPont, an equivalent fluoropolymer may be used

Ryton® is a registered trademark of Chevron Phillips Chemical, an equivalent polyphenylenesulfide may be used

Peek® is a registered trademark of Victrex, an equivalent polyetheretherketone may be used

Grafoil® is a registered trademark of UCAR Carbon Technology, an equivalent may be used

Viton® is a registered trademark of DuPont Dow Elastomers, an equivalent fluoroelastomer may be used

Kalrez® is a registered trademark of DuPont Dow Elastomers, an equivalent perfluoroelastomer may be used

Rulon® is a registered trademark of Saint-Gobain, an equivalent compounded PTFE based material may be used

3. Gear Material Combination

CODE	DRIVE	IDLE
1	RYTON®	RYTON®
2	316 SS	PEEK®
3	PEEK®	PEEK®
4	Alloy C	Alloy C
5	Alloy C	Teflon®
6	W88	W88
7	Teflon®	Teflon®
8	W88	Teflon®
9	Alloy C	PEEK®
A	Alloy C	RYTON®
B	316 SS	RYTON®
C	W88	RYTON®
D	W88	316 SS
E	316 SS	316 SS
F	316 SS	Teflon®
H	W88	PEEK®

4. Bearing Material

CODE	MATERIAL
C	Carbon Graphite Resin
P	Teflon®
J	Rulon®

5. Shaft Seal

CODE	STYLE			MATERIAL			
				Rotary Head	Stationary Head		
	Design	Seals	Case	Face	Elastomer	Face	O-Ring
B	Bellows	Single	316	Carbon	Viton®	Ceramic	Viton®
J	Bellows	Single	316	Silicon Carbide	EPDM	Silicon Carbide	EPDM
H	Bellows	Double	316	Carbon	Viton®	Ceramic	Viton®
Z	Bellows	Single	316	Silicon Carbide	Viton®	Silicon Carbide	Viton®
A	Wedge	Single	316	Carbon	Teflon®	Ceramic	Kalrez®
C	Wedge	Single	316	Carbon	Teflon®	Silicon Carbide	Kalrez®
D	Wedge	Single	Alloy C	Carbon	Teflon®	Ceramic	Kalrez®
F	Wedge	Single	Alloy C	Carbon	Teflon®	Silicon Carbide	Kalrez®
V	Wedge	Single	Alloy C	Silicon Carbide	Teflon®	Silicon Carbide	Kalrez®
G	Wedge	Double	316	Carbon	Teflon®	Silicon Carbide	Kalrez®
L	Two Lips Seals		304	Viton® Backed By Teflon®			
W	Mag-Coupled			Samarium Colbalt			

5. Additional Options

CODE	OPTION
C1 through C7	Factory Installed Options
T1 through T13	Non-Metallic Gear • Temperature Trim
B	Bearing Flush Ports
E	BSPT Threads
XX	Specials - Consult Factory
M1 -M7	Factory Installed Close Coupled Adapter - Mag-Coupled

CHEMSTEEL – Pump Selection Guide

The selection of the appropriate Chemsteel pump to fit a given application depends upon full knowledge of the application including both system parameters and fluid properties. Follow the guidelines given below when selecting a Chemsteel gear pump.

Chemical Compatibility: Select the basic materials of construction for the pump based upon chemical compatibility. Refer to Chemical Resistance Charts to decide on acceptable materials of construction. Then, consider the fluid's lubricity.

Lubricity: As a general rule, use only metal/plastic, plastic/plastic, or W88/W88 gear combinations for nonlubricating fl uids, typically viscosities less than 25 centipoise. Drive/idle gear combinations of 316/316 and Alloy-C/Alloy-C must only be used with lubricating fluids to avoid galling.

Pressure: Refer to the following table for limitations on pressure for various constructions. (Not applicable to tandem pumps, consult factory.)

A. Gears and Bearings

Gear Combination	Maximum Differential Pressure					
	Carbon bearings		Teflon Bearings		Rulon Bearings	
Plastic / Plastic	50 psi	3.4 bar	50 psi	3.4 bar	50 psi	3.4 bar
Metal / Plastic	100 psi	6.9 bar	50 psi	3.4 bar	75 psi	5.2 bar
Metal / Metal*	150 psi**	10.3 bar	Not Available		100 psi	6.9 bar

* Not available for pumps with Ryton housings.
** Mag Drive limited to 110 psi.

B. Housing

Housing	Maximum Differential Pressure		Maximum System Pressure	
Metal	150 psi	10.3 bar	300 psig, R1 & R2 Series	20.7 bar, R1 & R2 Series
Metal	150 psi	10.3 bar	225 psig, S4 & S9 Series	15.5 bar, S4 & S9 Series

Temperature: Refer to the following table for selection of the appropriate Trim Code when using plastic gears. Teflon or PEEK gears must be trimmed for applications exceeding 110°F (43°C). Ryton gears (to a maximum temperature of 200°F (93°C)) in either a Ryton or metal housing are thermally stable and do not require trimming.

Trim Code	Teflon/Rulon		PEEK	
T1	115 - 134°F	46 – 57°C	200 - 239°F	93 – 115°C
T2	135 - 154°F	57 – 68°C	240 - 279°F	116 – 137°C
T3	155 - 174°F	68 – 79°C	280 - 319°F	138 – 159°C
T4	175 - 194°F	79 – 90°C	320 - 359°F	160 – 182°C
T5	195 - 215°F	90 – 102°C	360 - 400°F	182 – 204°C
T6	216 - 236°F	102 – 113°C		
T7	237 - 257°F	114 – 125°C		
T8	258 - 278°F	126 – 137°C		
T9	279 - 299°F	137 – 148°C		
T10	300 - 320°F	149 – 160°C		
T11	321 - 341°F	161 – 172°C		
T12	344 - 362°F	173 – 183°C		
T13	363 - 383°F	184 – 195°C		

Code	Magnet Material	Temp. Limit
W	Somarium Cobalt	400°F / 204°C

Chemsteel pumps can be applied for temperatures as low as –40°F (-40°C) for pumps of plastic construction, or –50°F (-45.6°C) for pumps of metal construction.

Speed: All Chemsteel pumps are rated for operation at a speed of 1750 RPM.

Life and Noise: Pump life will always be extended and noise reduced by selection of either a plastic/plastic or metal/plastic gear combination. Also, the Chemsteel product line provides the user with the quietest operation possible by off ering both plastic combinations of gears and a helical gear profile.

CHEMSTEEL – Pump Selection Guide

Rheology: The power requirement for a given pump will increase with fl uid viscosity. For Newtonian fluids (where viscosity is not a function of shear) the table in the following section can be used directly. For non-Newtonian fluids, some adjustment must be made.

For shear thinning fl uids (Thixotropic or Pseudo Plastic), the dynamic viscosity may be considered to be approximately 25% of the viscosity tabulated in the literature. For those fl uids that are shear thickening (Dilatent, Bingham Plastic), extra care should be taken when selecting the appropriate pump and motor requirements. Usually, a trial would be well advised.

Viscosity: When pumping viscous fl uids, the horsepower required of the drive motor will increase. Refer to the following table for the appropriate multiplier to be used against the horsepower required when pumping water. "Water horsepowers" are available by reference to the individual fl ow curves that are available for all Chemsteel pumps.

Also, the pump speed must be reduced for viscous fl uids. Follow the guideline below for maximum shaft speed.

Users should be advised to increase the pipe size by one size over the pump's standard connection size on the inlet of the pump. On the discharge of the pump, the line size may similarly be increased if the user encounters excessive back pressure.

Chemsteel Pumps - High Viscosity Fluids, Power Requirement

I. Viscosity				II. Maximum Shaft Speed	III. Multipliers for Horsepower (Multiply X Water Horsepower)					
Liquid @ 70°F / 21°C	Centipoise CP @ 0.8 S.G.	Centistokes CS	Viscosity SSU	RPM	2 psi / 0.13 bar	20 psi / 1.37 bar	40 psi / 2.75 bar	60 psi / 4.13 bar	80 psi / 5.51 bar	100 psi / 6.89 bar
Water	1	1	5	1750	1.00	1.00	1.00	1.00	1.00	1.00
	9	11	50	1750	1.00	1.05	1.00	1.00	1.00	1.00
No. 2 Fuel Oil @ 57°F / 14°C	17	22	100	1700	1.10	1.10	1.05	1.05	1.00	1.00
	43	54	250	1600	1.20	1.15	1.10	1.10	1.05	1.05
SAE 10 Oil @ 62°F / 17°C	86	108	500	1500	1.30	1.25	1.20	1.15	1.10	1.10
	130	162	750	1400	1.45	1.35	1.25	1.20	1.15	1.15
SAE 30 Oil @ 72°F / 22°C	173	216	1000	1300	1.60	1.50	1.40	1.30	1.25	1.20
	432	540	2500	1200	1.90	1.75	1.60	1.45	1.35	1.30
SAE 60 OIL @ 70°F / 21°C	864	1080	5000	1000	2.20	2.00	1.80	1.60	1.50	1.40
	1296	1620	7500	850	2.60	2.30	2.00	1.80	1.70	1.60
SAE 70 OIL @ 60°F / 16°C	1728	2160	10000	600	3.00	2.60	2.20	2.00	1.90	1.80
	4320	5400	25000	500	3.50	3.00	2.70	2.40	2.20	2.00
No. 6 Fuel Oil @ 70°F / 21°C	8640	10800	50000	400	4.00	3.60	3.20	2.80	2.50	2.20
	12960	16200	75000	300	4.50	4.10	3.60	3.15	2.75	2.35
No. 6 Fuel Oil @ 60 °F / 16°C	17280	21600	100000	200	5.00	4.50	4.00	3.50	3.00	2.50

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