# XPD 676 PUMPS





Capacity to 1,600 GPM (363 M³/Hr)



Viscosity 28 to 2,000,000 SSU (1 to 440,000 cSt) With special construction



Pressure to 200 PSI (14 BAR) Higher pressures with factory approval



**Temperature**-20°F to +650°F (-29°C to +340°C)
With special construction



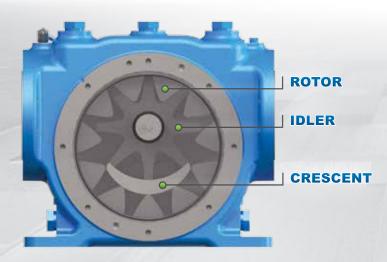
## INTERNAL GEAR TECHNOLOGY

Internal Gear (or gear-within-a-gear) technology was invented in 1902 by the founder of Viking Pump, which is the world-leading provider of internal gear process pumps. Internal gear pumps are rotary positive displacement pumps which move the same amount of fluid with each revolution of the shaft. The flow rate is directly proportional to the speed, which enables easy control over the entire performance range using variable speed drives.

Because system pressure has almost no impact on flow rate, unlike centrifugal pumps, internal gear pumps are excellent for continuous processes where multiple streams are metered together. Handling a broad range of viscosities, they are perfect for cold climate applications where oils and chemicals can become very thick in winter, or for handling polymers whose viscosity increases through the reaction process.

#### Other Viking benefits include:

- High Efficiency
- Reversible Direction of Flow
- Low NPSHr
- Self-priming
- Low Pulsation
- Low Shear
- Adjustable Clearances to Compensate for Wear
- Rigid Shaft Support on Both Sides of the Seal



### The API 676 Design Standard: **Full Compliance or With Exceptions**

Oil, gas and petrochemical plants worldwide select process equipment that conform to API standards to ensure they use only the ultimate in quality, dependability and safety. The API 676 design standard applies to Rotary Positive Displacement pumps like Viking Internal Gear pumps.

The XPD 676 Series from Viking Pump was specifically designed to be in full compliance with every detail of API's 100+ pages of specifications on everything from bearing life to magnetic particle testing of welds, to mounting foot flatness and parallelity. Full conformance reduces risk and simplifies project specs by eliminating sign-offs necessary on noncompliant equipment.

### TYPICAL APPLICATIONS

INTERNAL GEAR XPD 676 PUMPS

#### **Offshore Oil Platforms**

There are few environments that are more hazardous than an offshore oil platform. Safety is critical, with no room for mistakes. A major oil company selected Viking API 676 compliant pumps for both process (crude oil transfer) and utility (helicopter fuel) applications on oil platforms. These pumps easily handle temperature-related changes in liquid viscosity, and offer the greatest uptime assurance of any Viking Pump, a company known for reliability.

#### **Oil Terminals**

Rail is a critical mode of transportation of both crude oil and refined fuels. A recent terminal project involved twelve Viking API 676 compliant pumps for railcar loading of 17,000 BPD of heavy crude, and various grades of gasoline and ethanol, with pumps utilizing double mechanical seals and API seal plans.

#### **Oil Refineries**

Refineries handling heavier crudes, especially in extreme climates, can experience NPSHa problems related to incoming feedstocks (railcar loading and unloading) and inter-plant transfer using centrifugal or high-speed screw pumps. A major oil company selected Viking API 676 compliant pumps for unloading crude from railcars to processing.

### **Petrochemical Plants**

Petrochemical processes handle a broad range of materials, from thin solvents to ultra-viscous polymers. A major petrochemical company selected Viking API 676 compliant pumps for polyols at their Middle-East facility due to enhanced reliability ensured by meeting the standard.









### Viking Offers Three Options for API 676 Compliance:



 XPD 676 Series (models 4223AX/4323AX)

Steel pumps with 4-bolt mount API 682 cartridge seals and NO exceptions to the API 676 standard.



 Universal 682 Series (models 4223AA/4323AA

Steel or stainless steel pumps with 4-bolt mount API 682 cartridge seals, but with exceptions to the standard.



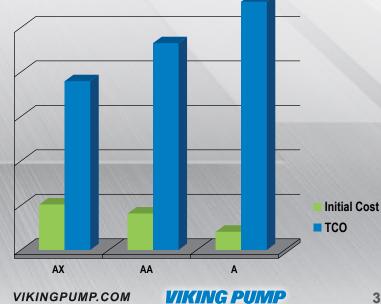
 Universal Seal Series (models 4223A/4323A)

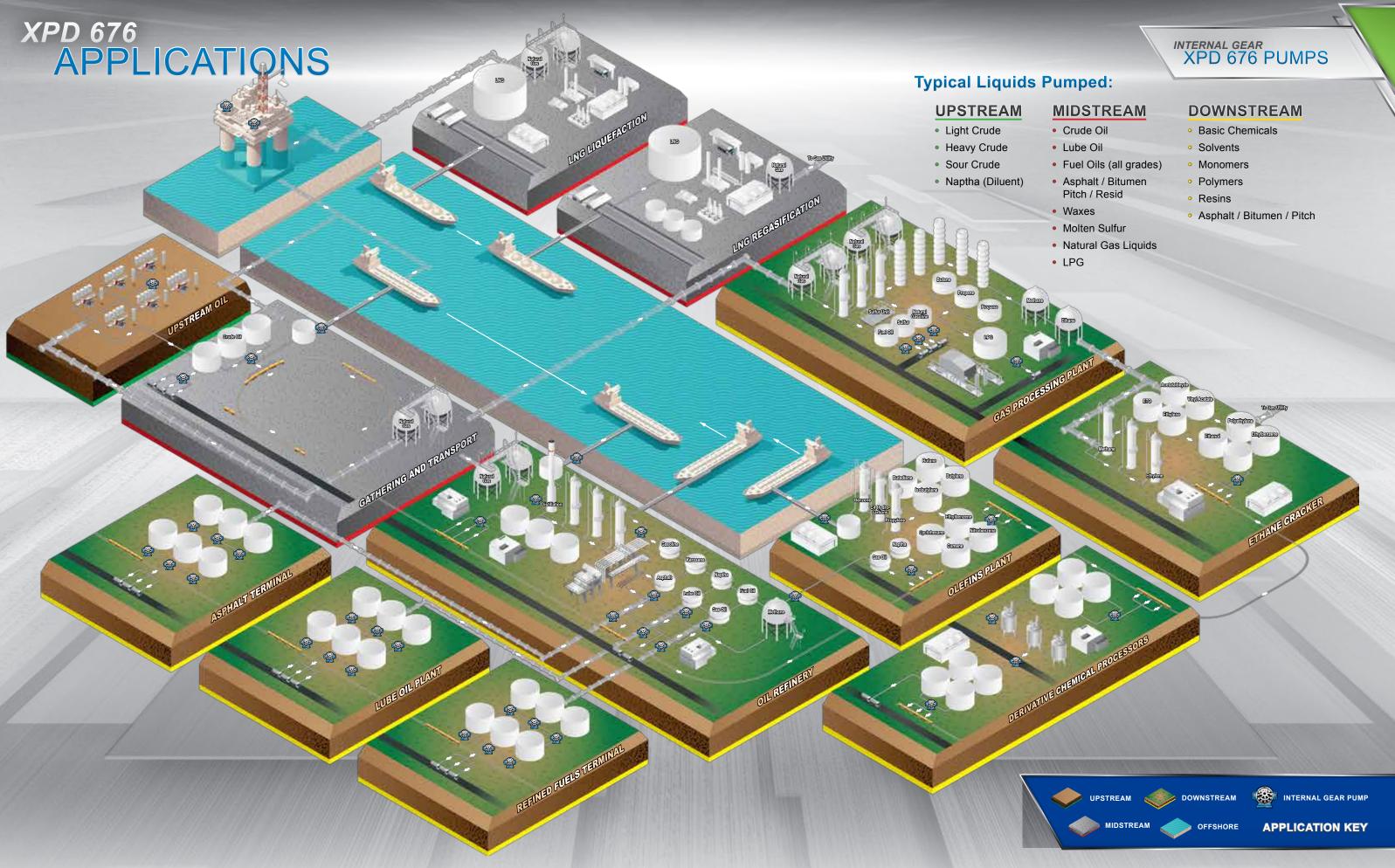
Steel or stainless steel pumps with 2-bolt mount cartridge seals with exceptions to the standard.

### **Total Cost of Ownership for API 676 Compliant Pumps**

Comparison of 4223AX, AA and A models assuming 10 year operating life (other assumptions listed below)

Initial Cost is only a small part of Total Cost of Ownership. Other components include installation and startup costs, power costs for operation, maintenance costs (parts and labor), cost of lost production due to unplanned downtime, and potentially catastrophic accident and litigation costs. This graph compares Viking's three alternatives for API 676 compliance, and illustrates that the XPD 676 Series (AX) models have the lowest Total Cost of Ownership due to their robust design, compared to the Universal 682 (AA) models and Universal Seal (A) models.





### XPD 676 PUMPS

### HOW XPD 676 REDUCES RISK

Why Use XPD 676 for Critical Chemical, Petrochemical, Oil & Gas Process Applications?

### Reduced Risk of Leakage

- · Static O-ring sealed joints provides improved sealing vs. flat gaskets
- Metal around tapped holes at least half the bolt diameter
- Non-Destructive Evaluation of castings and welds ensures quality
- · Performance tests validate integrity of wetted parts
- · Cast-in casing drain reduces leakage when removing for service

### **Reduced Risk of VOC Emissions**

- API 682 seals have established maximum vapor emission rates
- Double seals with API seal plans available to further reduce VOC emissions
- Viking enables use of the customers' plant standard API 682 seals
- Raised face Class 300 flanges exceed specified forces and moments

### **Reduced Risk of Corrosion Failure**

- Additional 3mm corrosion allowance over MACP on pressure-containing components
- Other alloys available:
- NACE compliant steel, low-temperature steel, stainless steel, Alloy 20, etc.
- Exposed parts protected with rust preventative at factory
- Ports covered with gasket and blind flange for long term storage

### **Reduced Risk of Overpressure Failure**

- Average of 80% more steel in XPD 676 pumps than equivalent Universal Seal models
- The Grade WCC steel used in XPD 676, stronger than Viking's standard Grade WCB
- Pressure containing components made of fully normalized and tempered steel
- High strength fasteners with grade and manufacturer stamp

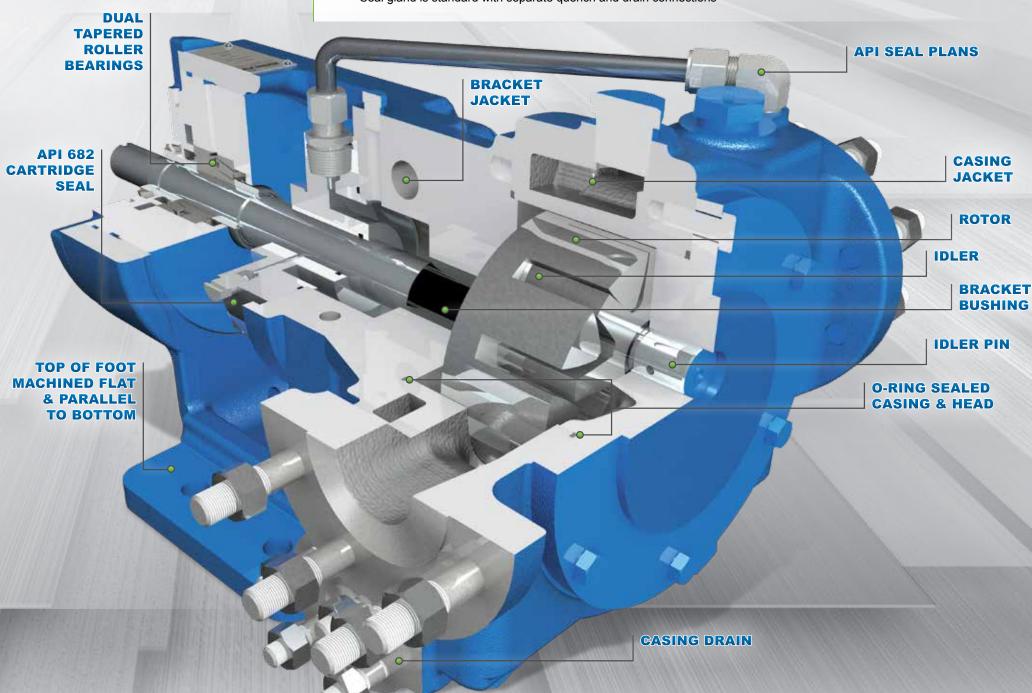
### **Reduced Risk of Unplanned Downtime**

- API 682 Seal designed to operate continuously for 25,000 hours
- Thrust bearings designed for minimum 25,000 hour L-10 life
- Operation at relatively low speeds (vs. screw or centrifugals)
- Optional hard parts available for abrasive liquids:
- Tungsten carbide or silicon carbide bushing & seal faces
- Hardened steel idler
- Hardening treatments or coatings

### API 682 Seals

GLOBAL LEADER IN POSITIVE DISPLACEMENT PUMPING SOLUTIONS

- Designed to operate continuously for 25,000 hours without need for replacement
- Enlarged seal chamber provides greater liquid volume for enhanced cooling
- Four-bolt mount with O-ring face seal helps prevent leakage & emissions
- Top porting of seal plan connections on gland plate to eliminate gas entrapment
- Seal gland is standard with separate quench and drain connections



## \*\*ESTING

SERIES				SPECIFICATIONS						
	XPD 676	Universal 682 Universal Seal		Standard Nominal Capacity Port at Maximum Speed			Maximum Speed	Maximum Pressure Differential		
Size	24	4	3	Inches	GPM	M³/Hr	RPM	PSI	BAR	
Н	_	4223AA①	4223A①	1.5	15	3	1750	200	14	
HL	4223AX	4223AA①	4223A①	1.5	30	7	1750	200	14	
K	_	4223AA①	4223A①	2	75	17	780	200	14	
KK	4223AX	4223AA①	4223A①	2	100	23	780	200	14	
LQ	_	4223AA①	4223A①	2.5	135	31	640	200	14	
LL	_	4223AA①	4223A①	3	140	32	520	200	14	
LS	4223AX	4223AA①	4223A①	3	200	45	640	200	14	
Q	4223AX	4223AA①	4223A①	4	300	68	520	200	14	
QS	4223AX	4223AA@	4223A②	6	500	114	520	200	14	
N	4323AX	4323AA②	4323A@	6	600	136	350	200	14	
R	4323AX	4323AA②	4323A@	8	1100	250	280	200	14	
RS	_	4323AA@	4323A②	10	1600	365	280	125	8.5	



① 90° Ports.

② Opposite Ports.



**Certified Performance Test** 



Mag Particle Test

OF	PERATIONAL & FUNCTION	AL TESTING .	VIKING API I	PORTFOLIO
	Test / Certification / Procedure	XPD 676	Universal 682	Universal Seal
	Material Traceability			
	Weld Maps			
ပ	Serialized Castings			
TESTING	Welder Certification			
	Welding Procedure Qualification			
QUALITY	Post-Weld Heat Treatment			
NAL	Visual Test (VT)			
g	Mag Particle Test (MT)			
	Dye Penetrant Test (PT)			
	Liquid (Hydro) Test (LT)			
	Air Pressure Test			
	Certified Performance Test			
NS NS	NPSHr Test			
TESTING	Mechanical Run Test			
	Sound Pressure Test			
ANC	Vibration Test			
RM/	Bearing Temp. Test			
ERFORMANCE	Pump Unit Test			
l iii	Visual Inspection, Internals			
1	Witnessed Tests			

= Available Option

= Not Available

③ Component seal or standard cartridge seal.

④ API 682 compliant cartridge seal (Category 1, 2 or 3).

## \*\*STANDARDS & OPTIONS

### INTERNAL GEAR XPD 676 PUMPS

		STAN	DARDS & OPTIO	NS		
	AX, 4323AX) Universal 682 Series		(4223AA, 4323AA)	Universal Seal Seri	es (4223A/4323A)	
Feature	Standard	Option(s)	Standard	Option(s)	Standard	Option(s)
External Materials of Construction	Steel, Grade WCC	Other Alloys	Steel, Grade WCB	Other Alloys	Steel, Grade WCB	Other Alloys
Jacketing	Bracket & Casing	Head	Bracket & Head	Casing	Bracket & Head	Casing
Bracket Bearing Seals	Lip Seals	Labyrinth Seals	Lip Seals	Labyrinth Seals	Lip Seals	None
Shaft Sealing	API 682 Cartridge Seals	None	API 682 Cartridge Seals	Cartridge Triple Lip Seals	Component Seals	2-Bolt Cartridge Seals Packed Gland
Bracket Seal Mounting Studs	(Quan 4) - B7 Material	None	(Quan 4) - B7 Material	None	(Quan 2) Grade 5 Material	None
Bracket Seal Mounting Nuts	(Quan 4) Heavy Hex	None	(Quan 4) Heavy Hex	None	(Quan 2) Hex	None
Mounting Feet to API 676 (flatness, spot face top, parallelity, hole diameter)	Yes	None	No	None	No	None
Corrosion allowance	3mm above MACP	None	Nominal	None	Nominal	None
Casing Ports	Opposite (180°)	None	90° H-Q, 180° QS-RS	180° K, KK	90° H-Q, 180° QS-RS	180° K, KK
Casing Flanges	Class 300 RF Standard	None	Class 150 Flat Face	Class 300 RF	Class 150 Flat Face	Class 300 RF
Casing Port Covers	Steel Blind Flanges Std	None	Wired Gasket Std	Blind Flanges	Wired Gasket Std	Blind Flanges
Casing Drain	Cast-in Class 300 Flg	None	None	NPT or Welded Flange	None	NPT or Welded Flange
Static Seals (Bracket/Casing, Casing/Head)	O-Ring	None	Gasket (806 Std)	O-Ring	Gasket (806 Std)	O-Ring
Product Contact Elastomers	Viton®	Kalrez®	Viton®	Kalrez®	Buna	Viton®, Kalrez®, Neo
Pipe Plugs	Hex Head	None	Hex Head	None	Square Head	None
Integral Pressure Relief Valve	Less Valve	None	Less Valve	With Valve	With Valve	Less Valve
Fasteners	Grade B7	None	Grade 5	None	Grade 5	None
Nameplate Data	Model, Serial & Item #; Min/Max Design Limits & Ratings	None	Model, Serial & Item #; Min/Max Design Limits & Ratings	None	Model #, Serial #	None
Shaft Hub	Cylindrical HL-N Tapered on R	Cylindrical on R	Cylindrical	None	Cylindrical	None
Keyway	Rectangular, Filleted	None	Rectangular, Filleted	None	Square	None
Wetted Material Traceability	Standard	None	Standard	None	None	Optional
Head Plate for Jacketed Models	Steel ASTM A216, Grade WCB	None	Steel ASTM A216, Grade WCB	None	Steel ASTM A216, Grade WCB	None
Idler	①② Cast Iron ASTM A48 Class 35B	None	①② Cast Iron ASTM A48 Class 35B	None	①② Cast Iron ASTM A48 Class 35B	None
Rotor	③ Cast Iron ASTM A48, Class 35B	4 Steel ASTM A148, Grade 80-40	③ Cast Iron ASTM A48, Class 35B	④ Steel ASTM A148, Grade 80-40	③ Cast Iron ASTM A48, Class 35B	④ Steel ASTM A148, Grade 80-40
Rotor Shaft	Steel ASTM A108, Grade 1045	None	Steel ASTM A108, Grade 1045	None	Steel ASTM A108, Grade 1045	None
Idler Pin	Hardened Steel ASTM A108, Grade 1045	None	Hardened Steel ASTM A108, Grade 1045	None	Hardened Steel ASTM A108, Grade 1045	None
Idler Bushing & Bracket Bushing	Carbon Graphite	None	Carbon Graphite	None	Carbon Graphite	None
Warranty	5 Years	None	3 Years	None	3 Years	None

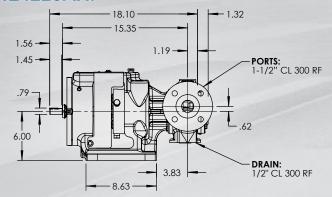
- ① Steel fitted Q and QS sizes have steel idler.
- ② H and HL sizes have powdered metal idler, MPIF Std 35 FC-0208-50.
- ③ KK, LS, QS, N and RS sizes have ductile iron rotor, ASTM A536 Grade 60-40-18.
- Material specification for HL steel rotor is AISI 8620, LS steel rotor is ASTM A148 80-50.

Kalrez® and Viton® are registered trademarks of DuPont Performance Elastomers.

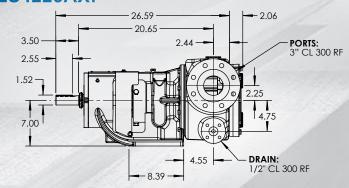
= Standard

## XPD 676 DIMENSIONS

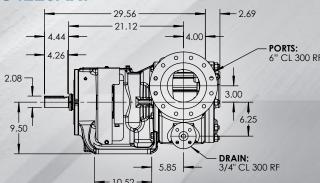
### HL4223AX:



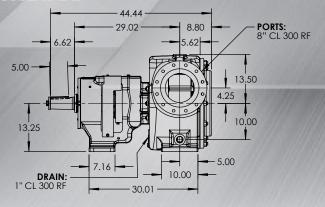
### LS4223AX:



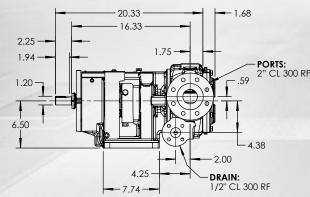
### QS4223AX:



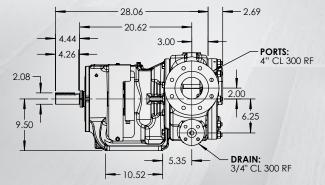
#### R4323AX:



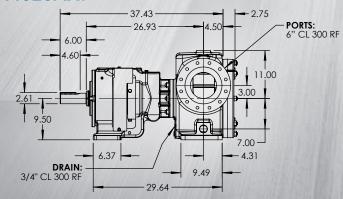
### KK4223AX:



### Q4223AX:



### N4323AX:



## COMPLY WITH ALL OF THESE?



### If not, it doesn't comply with API 676 standards. Viking XPD 676 DOES:

- ✓ Materials of Construction pressure-containing components carbon steel (ASTM A216, Grade WCC).
- ✓ Bearing Life minimum 25,000 hour L-10 life at maximum speed and pressure conditions.
- Seal Gland accepts most major brands of API 682 cartridge seals to enable compliance with plant seal standards
- Casing Drain and Seal Chamber Venting Port enable complete draining of casing before opening pump for maintenance.
- Fasteners have the material grade and manufacturer's identification symbols applied.
- In pressure containing areas, metal at least half the nominal bolt diameter left around drilled and threaded holes.
  Depth of threaded holes at least 1.5 times stud diameter.
- ✓ All threaded openings plugged with long-shank or hex-head, taper-threaded plugs per ASME B16.11.
- ✓ Flanges conform to ASME B16.5 Class 300.
- ✓ Mounting surfaces (feet) machined to 25 μm (0.001 in.) flatness, with a minimum finish of 6.3 μm (250 μin.) Ra.
- ✓ Casing and bracket feet are flat and parallel within 150 µm/m (0.002 in./ft) of distance between them.
- Upper side of mounting feet are spot faced parallel to the mounting surface for superior alignment.
- The casing, head and bracket are designed with an additional 3 mm (0.12 in.) corrosion allowance over and above the casing thickness needed for the maximum allowable casing pressure (MACP).
- Nameplate includes item number, serial number, pump size and type, minimum and maximum allowable design limits and rating data, MAWPs and temperatures, hydrostatic test pressures and critical speeds.
- ✓ Metal Port Covers protects pump internals prior to installation
- ✓ Tight shaft tolerances lower vibration: +0.0000 / -.0005 on H-LS sizes; +.0000/ -.0010 on Q-RS sizes.
- ✓ Rectangular keyways transmit more torque because the keyseat is stronger.
- ✓ Keyway fillet radii conforming to ASME B17.1 to reduce stress concentration.
- √ Tapered shaft hub on R and larger sizes to reduce the clearances between the shaft and the coupling bore.

### VIKING PUMP ADVANTAGE

### INTERNAL GEAR XPD 676 PUMPS

Viking Pump has been a global leader in positive displacement pumping solutions since 1911. With a vertically integrated manufacturing process, we have the tools, processes and systems to produce our products in-house; from the initial engineering analysis, through design layout, foundry casting and machining, to final assembly/testing and shipping. Viking pump is uniquely designed for the task at hand, from simple solutions to your most advanced and demanding needs.



WORLD HEADQUARTERS



MANUFACTURING & IRON FOUNDRY



ALLOYS FOUNDRY

### **WATCH THE VIDEOS**



Learn more about XPD pumps.

Scan this QR code or visit
VIKINGPUMP.COM/XPD-VIDEOS



## **VIKING PUMP**

#### VIKING PUMP, INC.

A Unit of IDEX Corporation 406 State Street Cedar Falls, Iowa 50613 U.S.A. Telephone: (319) 266-1741 Fax: (319) 273-8157 vikingpump.com

### **Contact Your Distributor Today**

Distributed By:

United States www.vikingpump.com Cedar Falls, Iowa Phone: (319) 266-1741

Canada www.vikingpumpcanada.com Windsor, Ontario Phone: (519) 256-5438 Europe & Africa www.vikingpump.com Shannon, Ireland Phone: +353 (61) 471933

Asia-Pacific www.idexfmt-asia.com China - Shanghai Phone: +86-21-5241-5599 Singapore Phone: +65-6684-7305 India - Mumbai Phone: +91-22-66780049/53

Phone: +91-22-66780049/3 **Korea - Seoul** Phone: +82-19-9134-1110 Latin America www.vikingpump.com Mexico D.F., C.P. Phone: +52 (55) 5255-1357

Mexico D.F., C.P. Phone: +52 (55) 5255-1357 Brazil - Sao Paulo Phone: +55 (19) 3871-3500 Australia & New Zealand www.vikingpump.com Australia Phone: +61 (0)2 4574 0448 Middle East www.idexfmt-asia.com Dubai, UAE Phone: +973-4-299-1095/1097

