

# Blackmer®

Experts  
in Mission  
Critical  
Flow Solutions

MILITARY-MARINE  
Bulletin 1501-001



Where Innovation Flows

ROTARY VANE/POSITIVE DISPLACEMENT PUMPS  
CENTRIFUGAL PUMPS  
HAND PUMPS

  
a **DOVER** company

[blackmer.com](http://blackmer.com)



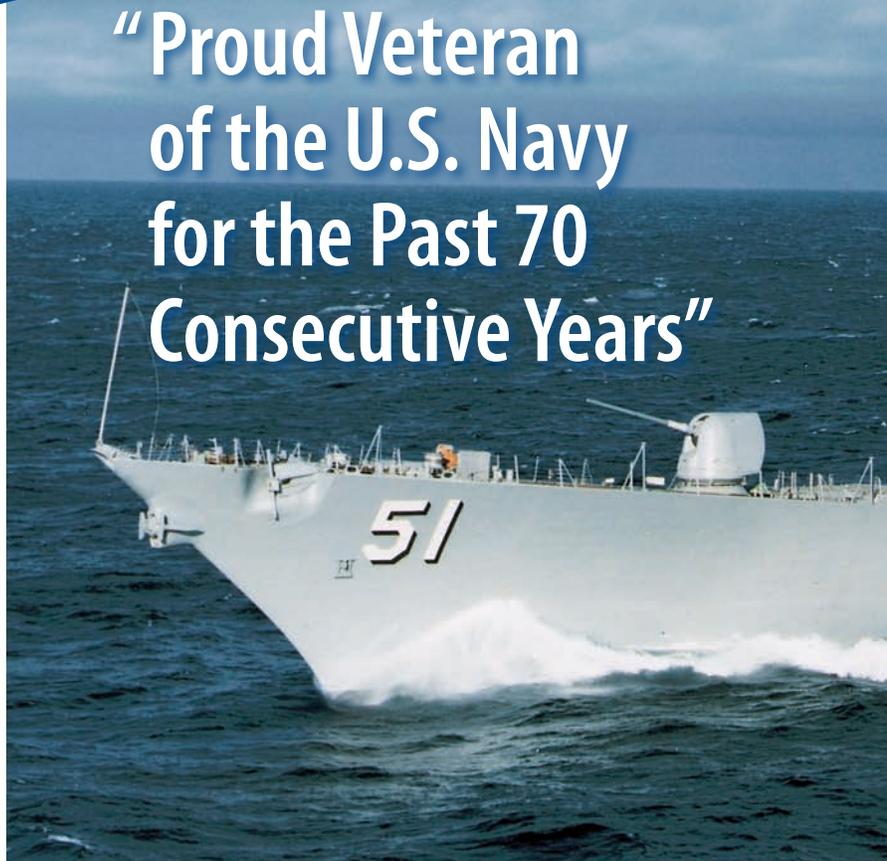
## Shipboard Standard All Over The World

Over half a century ago, when the U.S. was building up the largest fleet of naval vessels the world had ever seen, Blackmer® began providing fuel pumps for ships ranging from destroyers to aircraft carriers. Under the most difficult conditions imaginable, Blackmer pumps excelled, providing rock-solid reliability when and where it was needed most.

As a result, virtually every major Navy vessel that has sailed since then has done so with Blackmer pumps aboard. Those pumps have handled transfer, circulation, stripping, loading, and unloading of a variety of fluids, including fuel oil, AFFF concentrate, bilge water, JP5, lube oil, waste water and more.

Now this same technology is available for your vessels in Blackmer military and marine pumps. These pumps are designed to meet the specifications of MIL-P-19131 and ASTM F1510 and utilize technology developed to meet the most stringent commercial standards for design, construction and operation. These pumps have proven themselves time and time again in hundreds of applications. And that means the investment you make in Blackmer pumps will pay off handsomely in longer life, better efficiency, lower maintenance and greater reliability. Blackmer military and marine pumps are, literally, the U.S. Navy's definition of what a shipboard pump should be. Now, Blackmer pumps will provide the same long-term advantages on which the Navy has been relying for over 70 years in your ship, too.

“Proud Veteran  
of the U.S. Navy  
for the Past 70  
Consecutive Years”



## Proven Design, Proven Supplier

The basic design for Blackmer military and marine pumps goes back almost 100 years, when Robert Blackmer developed the first rotary-vane pump. Today, the descendants of that pump are in use all over the world, on land and at sea.

Blackmer utilizes advanced processes and equipment to assure production efficiency and quality. Plus, Blackmer has its own captive foundry to assure castings always meet the highest standards.

## High-strength, Low-maintenance

Blackmer acquired the System One® product line in 2000 and the line has continued to be a strong workhorse in the Military & Marine market. These products are a high-strength, low-maintenance line of innovative process pumps and have set industry standards (high quality and durability) for nearly 20 years.



## Innovative Process Pumps

The intricate design of the System One centrifugal pump dates back to the early 1980s. When the initial plans for the System One pump were created, engineers addressed all of the weak points of pump design that were untouched by other manufacturers.

As a result, the System One product continues to offer the highest strength of construction and the most comprehensively thought-out design required to reduce or eliminate maintenance problems.





# The Navy Doesn't Leave Port Without These Pumps. Neither Should You.

## Blackmer Rotary Vane Pumps

These are the most commonly used Blackmer military and marine positive displacement pumps. If one of these units doesn't meet every one of your application requirements, we'll develop one that will.

## Motor Driven Pumps

### Model HXL10

Size: 10"  
Capacity: 2,020 - 2,500 gpm  
Discharge Pressure: 0 - 125 psig

### Model HXL8

Size: 8"  
Capacity: 1,125 - 1,220 gpm  
Discharge Pressure: 0 - 125 psig

### Model BHXL6

Size: 6"  
Capacity: 150 - 750 gpm  
Discharge Pressure: 0 - 150 psig

### Model BHXL4

Size: 4"  
Capacity: 100 - 540 gpm  
Discharge Pressure: 0 - 150 psig

### Model BHXL3

Size: 3"  
Capacity: 75 - 275 gpm  
Discharge Pressure: 0 - 150 psig

### Model BXL2 1/2

Size: 2 1/2"  
Capacity: 35 - 150 gpm  
Discharge Pressure: 0 - 200 psig

### Model BXL2

Size: 2"  
Capacity: 20 - 80 gpm  
Discharge Pressure: 0 - 200 psig

### Model BXL1 1/2

Size: 1 1/2"  
Capacity: 10 - 55 gpm  
Discharge Pressure: 0 - 100 psig

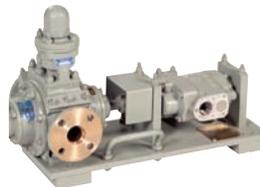
### Model BXL1 1/4

Size: 1 1/4"  
Capacity: 5 - 40 gpm  
Discharge Pressure: 0 - 200 psig

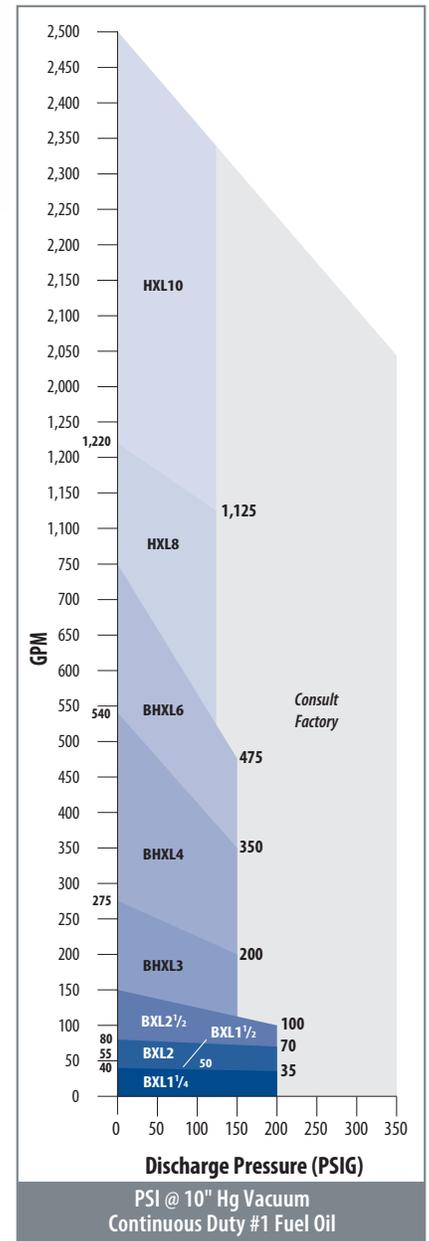
## Hand Pumps

### Models: 414/807/828

Sizes: 3/4" - 1 1/2"  
Capacities: 7 - 28 gpm



Air-Driven Defueling Pump



## Pumping Services

- JP5 Transfer
- JP5 Service
- JP5 Stripping
- JP5 Defueling
- Fuel Oil Transfer
- Fuel Oil Service
- Fuel Oil Stripping
- Bilge
- Oily Waste
- Waste Water
- AFFF Concentrate
- Lube Oils
- Auxiliary Service
- Potable Water
- Bunker C
- High Capacity Barge Loading and Offloading

## Features

Designed to meet the requirements of ASTM F1510, F1511 and MIL-P-19131. Self-priming, ease of maintenance, low operating speeds, internal pump relief valve, hot oil or steam jackets, choices for materials of construction include – bronze, stainless steel, nodular iron. Some designs have features of low magnetic signature, or non-sparking.

## Durability

Approved for high-impact shock and vibration in accordance with MIL-S-901D, MIL-STD-167 Type I & Type II.



# Blackmer Rotary Vane Pumps are Different and Better

## Design And Construction

The design and construction of Blackmer military and marine pumps have been refined through over seventy years of real-world use. That's why they boast features you won't find on other pumps – features that improve performance, reduce maintenance and extend life.

## Greater Operating Efficiency

Typically, a Blackmer positive displacement pump requires 20% less energy than other positive displacement-type pumps when handling fluids ranging from 30 to 100,000 ssu (2 to 21,000 cSt). The key to this greater operating efficiency lies in the Blackmer pump's operating principle. As the accompanying schematic shows, every revolution of a Blackmer pump transfers a consistent volume of liquid in a sealed chamber from inlet to outlet. Each vane provides positive mechanical and hydraulic "work" to the liquid. Sliding vanes maintain close tolerances and effective sealing, even after significant wear, so efficiency-robbing "slip" is minimized throughout the pump's life. Throughout the pump's operating range, volumetric efficiency remains above 90%, allowing the Blackmer pump to deliver consistent performance over an extended period of time.

## Easier, Less Frequent Maintenance

No pump is maintenance-free. However, the Blackmer pump's operating principle minimizes maintenance requirements – and the pump's design simplifies maintenance procedures.

With mechanical seals, isolated bearings, and self-adjusting sliding vanes, Blackmer pumps require far less attention than other pumps to maintain reliable, leak-free, high-efficiency performance. When maintenance is required, however, most work – including removing and replacing pump-wearing surfaces – can be done while the pump remains attached to its piping and drive. This keeps overall maintenance costs to a minimum, and adds even more to the pump's long-term cost-effectiveness.

## Better Performance

Since the Blackmer sliding vane design maintains tight clearances and efficient operation, the Blackmer pump has exceptional self-priming and line-stripping capabilities which are essential for many marine applications. And while it's not designed for dry running, the sliding vane configuration minimizes the wear and damage dry running can cause.

# Rotary Vane Pump Components

### 1. External ball/roller bearings:

Completely protected from pumpage by mechanical seals, these externally lubricated low-friction bearings last longer and reduce power requirements.



### 2. Bronze pump body and heads:

Nodular iron and highly ductile bronze resists thermal and mechanical shocks, while bronze provides superior corrosion resistance essential for many marine applications. And while it's not designed for dry running, the sliding vane configuration minimizes the wear and damage dry running can cause.

### 3. Mechanical seals:

Designed to meet the specifications of ASTM F1511, Blackmer mechanical seals provide optimal fluid isolation and bearing protection. A variety of seal materials are available to assure fluid compatibility.



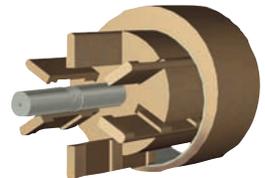
### 4. Lock collars:

Special Blackmer design allows pump units to be mounted in vertical or horizontal orientations to provide maximum design and installation flexibility.



### 5. Easily replaceable wearing parts:

The liner and vanes can be replaced quickly – with the pump still connected to drive and piping – to bring internal pump tolerances back to original levels.



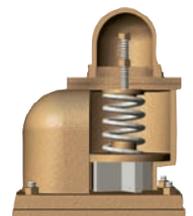
### 6. Symmetrical bearing support:

The pump rotor is centered between the two bearings to distribute loads equally on both bearings. This minimizes wear to the bearings and shaft, improving reliability and lengthening life.



### 7. Adjustable relief valve:

The integral relief valve provides essential protection against excessive pressure build-up and the damage it can cause.



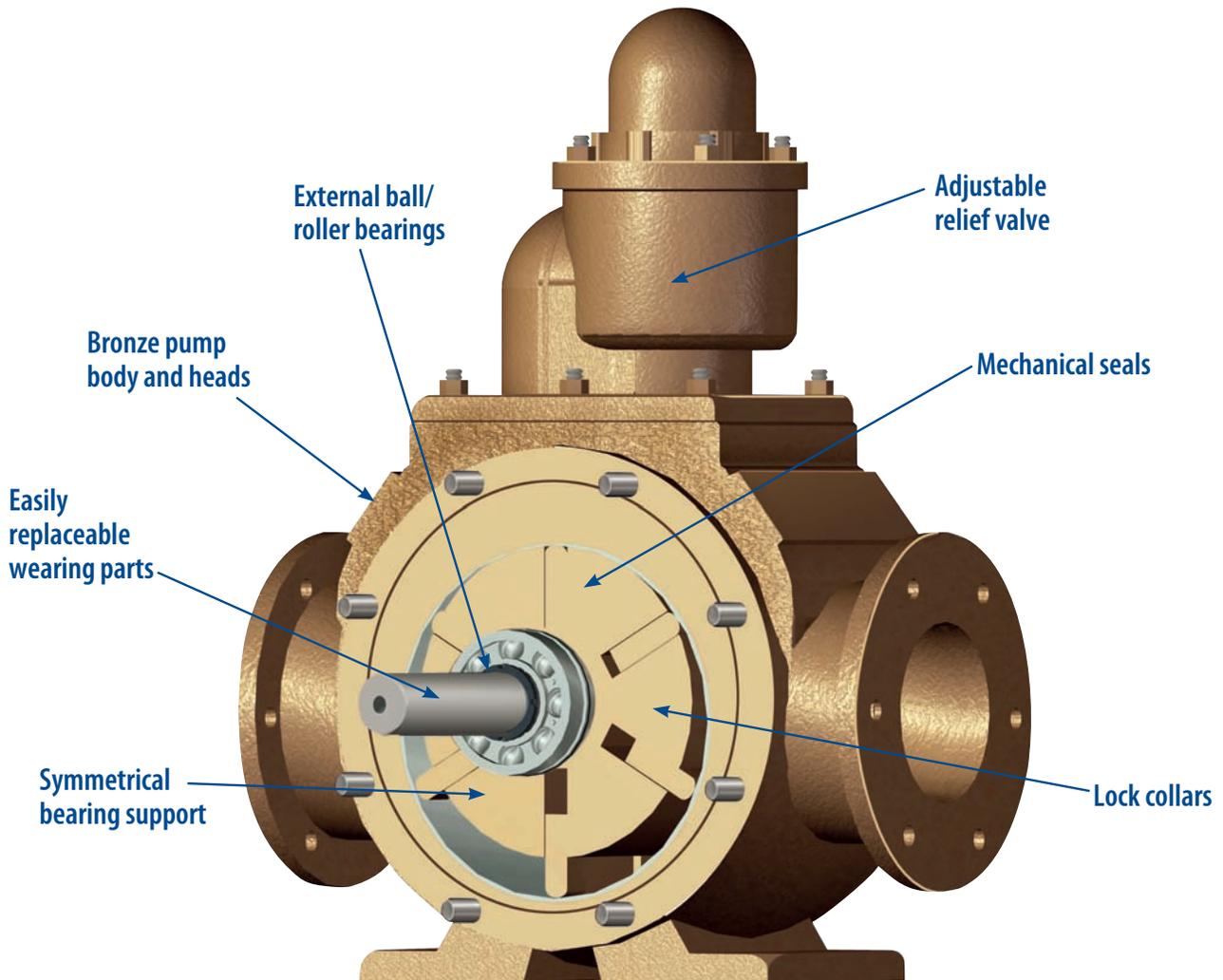
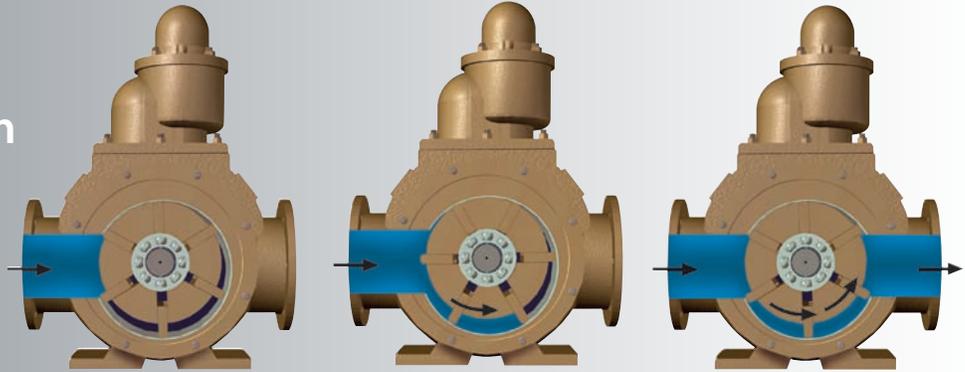
## Self-compensating Sliding Vanes:

*A Blackmer-developed design that allows the pump to maintain volumetric efficiency at near-original levels, even after significant wear.*

## How Blackmer's Sliding Vanes Maintain Efficiency.



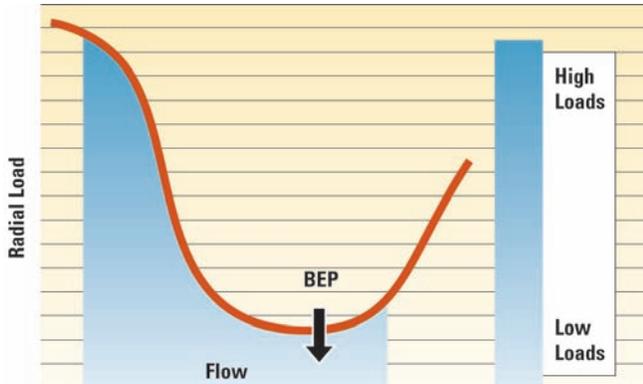
## How Blackmer's Sliding Vane Action Works.





# System One® Heavy Duty Process Pumps

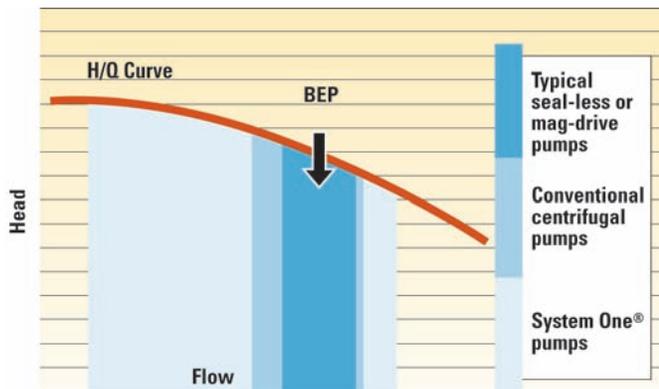
## Wider Window of Operation Off the BEP (Best Efficiency Point)



Many processes demand operation off the BEP where higher loads can create damaging vibration.

### Process Pump Challenges:

- Due to process changes and variations, the majority of process pumps operate off the BEP where radial loads create high stresses.
- Conventional pumps are prone to damaging shaft vibration under off-BEP conditions.
- Seal and bearing failures result from vibration damage.

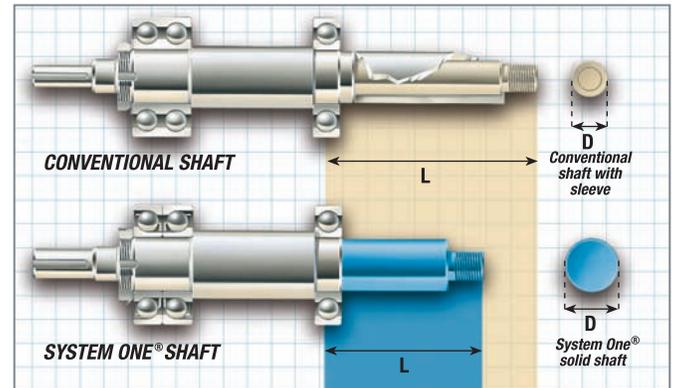


System One® pumps resist vibration for a larger operational window off the BEP and greater reliability.

### System One® Is The Solution:

- Heavy-duty design for the toughest applications in the process industry.
- System One pumps are designed to prevent vibration under high radial loads.
- System One pumps offer the widest operational window off the BEP of any standard process pump.
- Seals and bearings last longer for greater system reliability.
- When your process demands that pumps vary from the BEP, System One will save you money and prevent lost production.

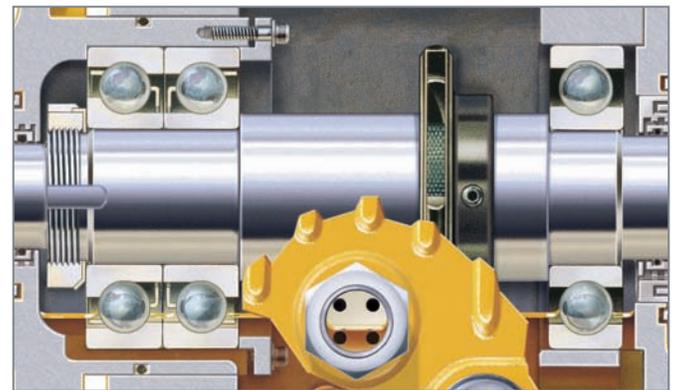
## Shaft



### Solid design, low deflection shaft prevents common vibration damage

- Prevents common vibration damage.
- Heavier duty construction and lower stiffness ratios than competing pumps.
  - Frame S – 46 (1.9)
  - Frame LD17 – 17 (.65)
  - Frame M – 19 (.87)
- Greater stability at seal area improves seal life.
- Short shaft overhang reduces bearing load to extend bearing life.

## Bearings



### Heavy duty bearings with longer bearing life

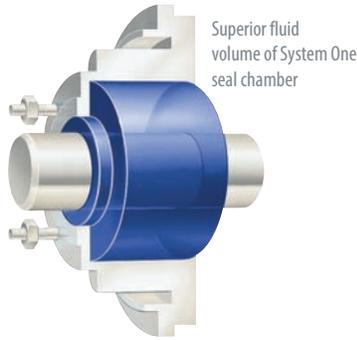
- Larger bearings than competing pumps for greater load capacity and bearing life.
- Bolted retainer cover locks thrust bearing into cartridge for enhanced reliability.
- Angular contact thrust bearings as required by API 610 specification.



# Detailed Features Of Reliability – Enhancing Components



Limited fluid volume of conventional stuffing box



Superior fluid volume of System One seal chamber

## Large Bore Seal Chamber

### Lubricates, cleans, cools the seal to prevent premature seal failures

Most conventional pumps confine seals within the stuffing box designed for packing. As a result, the seal is subjected to punishing conditions with little fluid volume to provide cooling and cleaning. This style seal chamber with a large fluid volume is now universally considered to be a superior seal environment, enhancing reliability and extending seal life. The System One seal chamber is standard equipment and is unmatched in reliability due to its large volume design. Optional models are available with cooling jackets and are easy to install and, most importantly, easy to clean.

Two industry-tested seal chamber designs provide the right seal environment for virtually any process application.

Large volume seal chambers accept standard-sized glands.

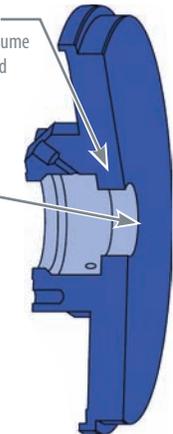
Available seal chamber jackets provide optimum cooling or heating of seal chamber fluid.

<sup>1</sup>SpiralTrac is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd., Waverly, Nova Scotia.

### Straight Bore

Large seal chamber provides optimum volume for seal lubrication and cooling.

Cast restriction bushing reduces fluid exchange between casing and seal chamber and allows maximum cooling of fluid. Other bushing options are available, including carbon and SpiralTrac<sup>1</sup>



### Taper Bore

Air or gas buildup can be detrimental to seal life. Taper design allows trapped air and gases to escape, while providing maximum fluid circulation around the mechanical seal. This is standard construction for the LD17 configuration. Carbon bushing option available with certain seals.



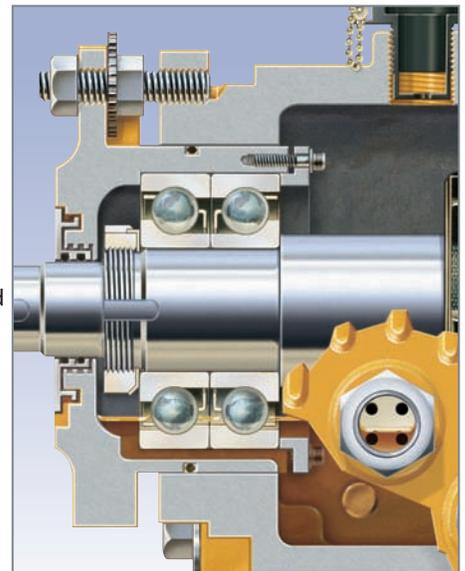
## Bearing Housing

### Bearing protectors preserve L10 life

Patented System One<sup>®</sup> labyrinth seals (pat. #4,572,517) are standard on System One pumps and offer non-wearing, lifetime protection superior to common lip seals.



Patented System One labyrinth seals (pat. #4,572,517) are standard construction. Small amounts of dirt and water can cause complete bearing failure in a short period of time. System One labyrinth seals keep dirt and moisture out, prolonging oil and bearing life.



# System One® Heavy-Duty Process Pumps – Interchangeability Chart

Motor Adaptor	Power End	Back Cover	Impeller Open	Casing	Pump Size ANSI
	<b>Frame S ANSI</b> 				1 x 1½ – 6 2 x 3 – 6 1 x 1½ – 8 1½ x 3 – 8
	<b>Frame A ANSI</b>  <b>LD17</b> 				2 x 3 – 8 3 x 4 – 8 2 x 2 – 8 Vortex 1 x 2 – 10 1½ x 3 – 10 2 x 3 – 10 3 x 4 – 10 4 x 6 – 10 3 x 3 – 10 Vortex 1½ x 3 – 13 2 x 3 – 13 3 x 4 – 13 4 x 6 – 13 4 x 4 – 12 Vortex
	<b>Frame M</b> 				6 x 8 – 13 8 x 10 – 13 6 x 8 – 15 8 x 10 – 15

## System One® Pumps Featuring LD and Close-Coupled Designs

**Standard For Reliability** – High-strength, low-maintenance line of innovative process pumps that have set the standard for high quality and durability.

**Features** – Exclusive features eliminate common seal and bearing failures. Pump is actually designed around the seal and bearings where 90% of failures occur.

**Construction** – Heavy-duty construction allows wider window of operation off the BEP.

**Durability** – Lowest shaft stiffness ratio (L3/D4) pumps in the process industry.

- Frame S – 46 (1.9)
- Frame LD17 – 17 (.65)
- Frame M – 19 (.87)

Approved for high-impact shock and vibration in accordance with MIL-S-901D, Grade A and MIL-STD-167 Type 1.



Vertical



Frame A



Vortex



Frame S



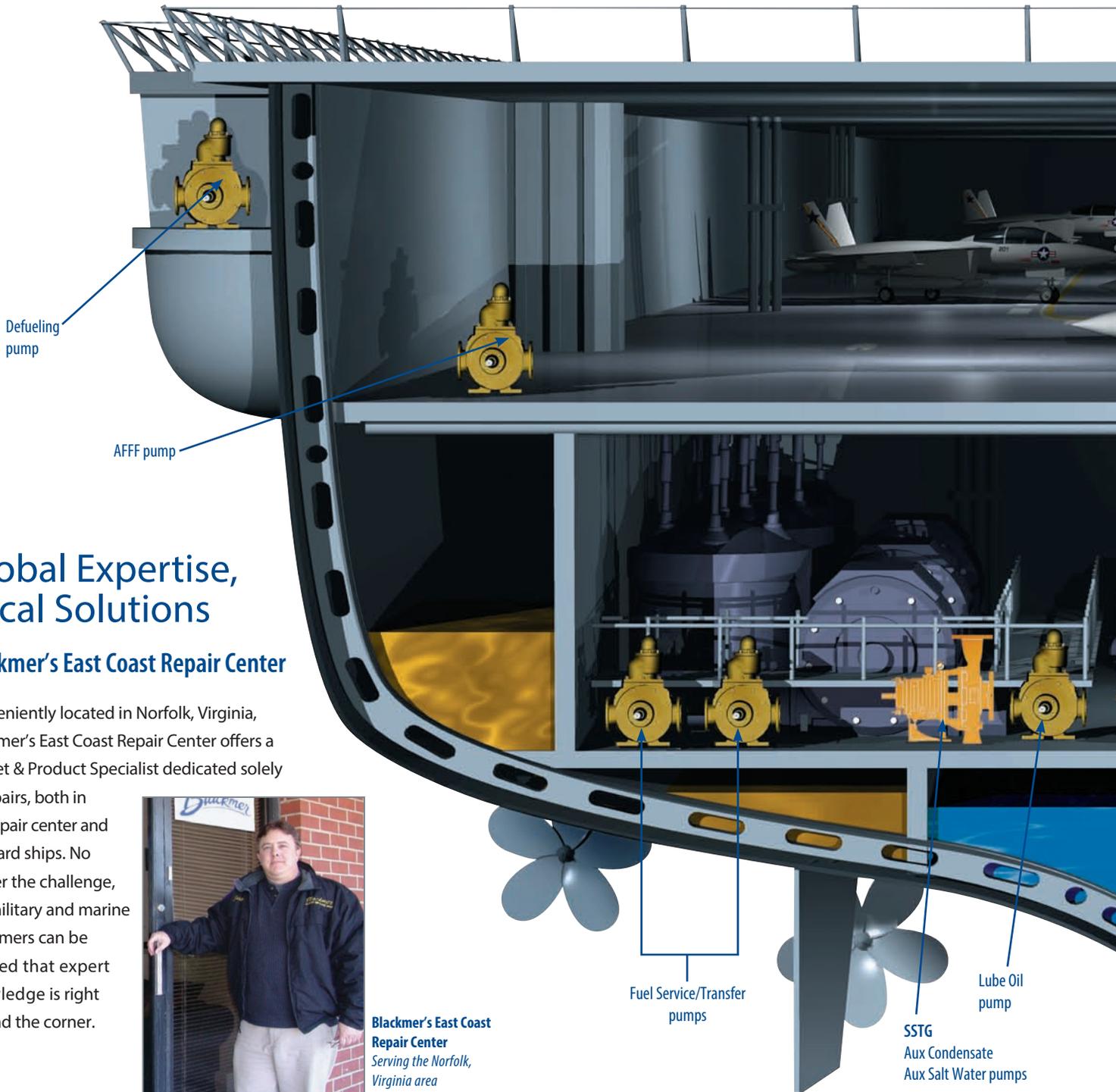
Close-Coupled



Frame M

# Where Blackmer Pumps Work the Hardest. And Last the Longest.

The illustration indicates the most common applications for Blackmer's standard marine pump units. It is by no means a comprehensive listing of Blackmer's shipboard fluid handling capabilities. If you don't see your application listed, contact Blackmer's Military & Marine Group for further information and assistance.



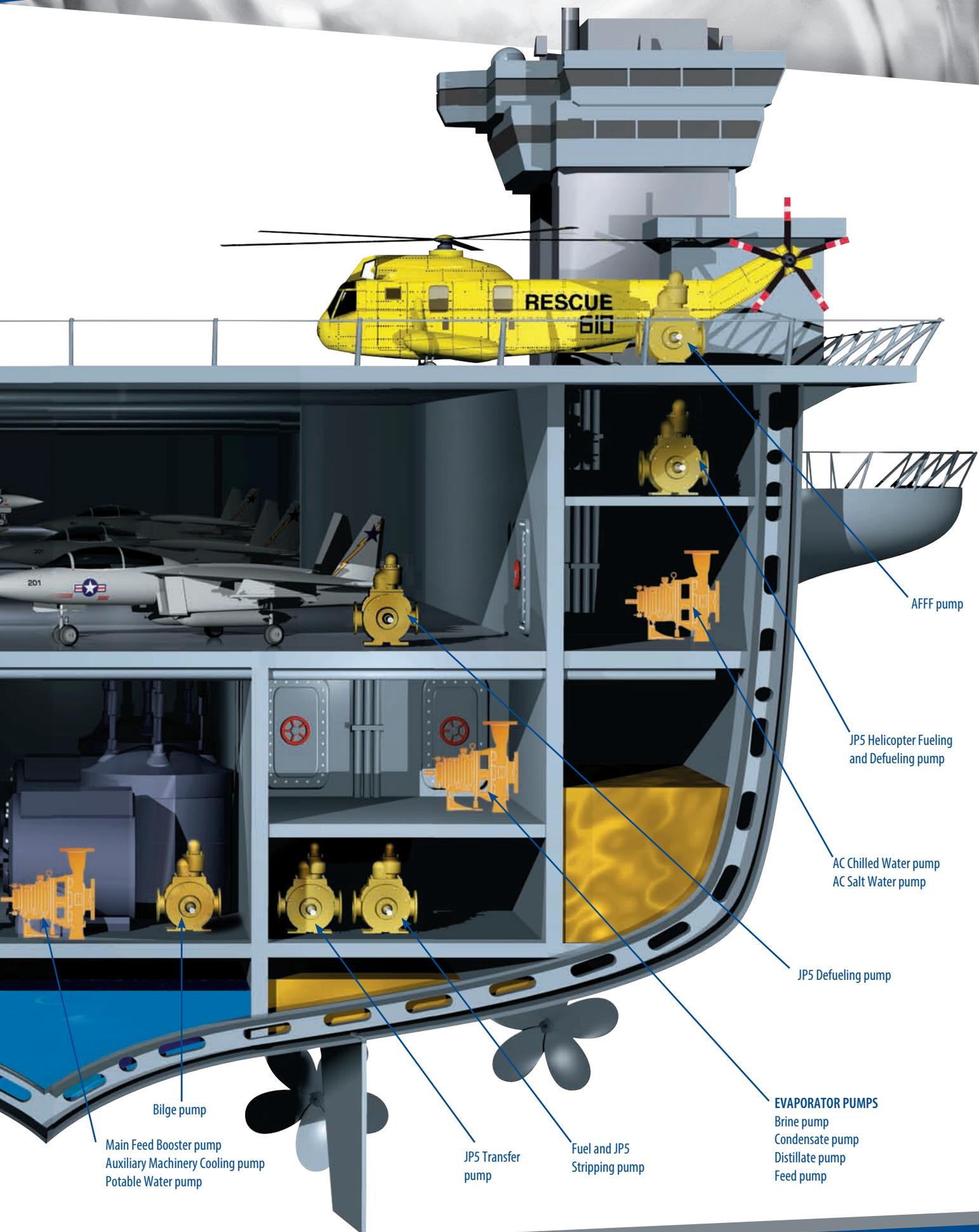
## Global Expertise, Local Solutions

### Blackmer's East Coast Repair Center

Conveniently located in Norfolk, Virginia, Blackmer's East Coast Repair Center offers a Market & Product Specialist dedicated solely to repairs, both in the repair center and onboard ships. No matter the challenge, our military and marine customers can be assured that expert knowledge is right around the corner.



**Blackmer's East Coast Repair Center**  
Serving the Norfolk, Virginia area and beyond.





Blackmer World Headquarters  
1809 Century Avenue SW  
Grand Rapids, MI 49503-1530 USA  
T: +1 (616) 241-1611  
F: +1 (616) 241-3752  
[blackmer.com](http://blackmer.com)

## Where Innovation Flows



PSG® reserves the right to modify the information and illustrations contained in this document without prior notice. This is a non-contractual document. 11-2016

Authorized PSG Partner: