

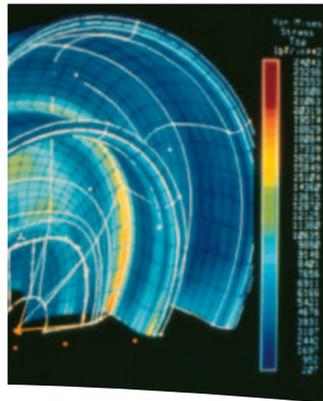


# *Durco® Mark 3™ ISO Chemical Process Pump*

ISO 2858/5199



*Experience In Motion*



## ***Pump Supplier to the World***

*Flowserve is the driving force in the global industrial pump marketplace. No other pump company in the world has the depth or breadth of expertise in the successful application of pre-engineered, engineered and special purpose pumps and systems.*

### ***Life Cycle Cost Solutions***

Flowserve is providing pumping solutions which permit customers to reduce total life cycle costs and improve productivity, profitability and pumping system reliability.

### ***Market Focused Customer Support***

Product and industry specialists develop effective proposals and solutions directed toward market and customer preferences. They offer technical advice and assistance throughout each stage of the product life cycle, beginning with the inquiry.

### ***Broad Product Lines***

Flowserve offers a wide range of complementary pump types, from pre-engineered process pumps, to highly engineered and special purpose pumps and systems. Pumps are built to recognized global standards and customer specifications.

Pump designs include:

- Single-stage process
- Between bearings single-stage
- Between bearings multistage
- Vertical
- Submersible motor
- Rotary
- Reciprocating
- Nuclear
- Specialty

### ***Product Brands of Distinction***

*AGEC™ Centrifugal Pumps*

*Aldrich® Pumps*

*Byron Jackson® Pumps*

*Calder™ Energy Recovery Devices*

*Cameron® Pumps*

*Durco® Pumps*

*Flowserve® Pumps*

*IDP® Pumps*

*Jeumont-Schneider™ Pumps*

*Niigata Worthington™ Pumps*

*Pacific® Pumps*

*Pleuger® Pumps*

*Scienco® Pumps*

*Sier-Bath® Rotary Pumps*

*TKL™ Pumps*

*United® Centrifugal Pumps*

*Western Land Roller® Irrigation Pumps*

*Wilson-Snyder® Pumps*

*Worthington® Pumps*

*Worthington Simpson® Pumps*

**Durco Mark 3 ISO  
Chemical  
Process Pump**



**The Premier Name in  
Chemical Process Pumps**

The Durco Mark 3 ISO chemical process pump provides outstanding hydraulic performance, unrivaled reliability and low total cost of ownership. Conforming to ISO 2858 dimensional and ISO 5199 design criteria, the Durco Mark 3 ISO incorporates many proven reliability- and performance-enhancing features. The resultant benefits are:

- Renewable, high-efficiency performance over the life of the pump with the reverse vane impeller
- Optimal, predictable seal chamber pressures that are re-established after every impeller setting
- Maximal mechanical seal life due to an ideal seal environment created by the SealSentry seal chamber
- Robust shaft and bearing designs that minimize shaft deflection and extend mechanical seal and bearing life
- Fast and accurate impeller setting with the industry's most innovative external impeller adjustment mechanism
- In-shop reverse vane impeller adjustment with the only pump that takes full advantage of the back pull-out design

**Global Design, Unmatched Performance**

Conforming to ISO 2858 dimensional and ISO 5199 design criteria, Durco Mark 3 ISO chemical process pumps are available in many designs and configurations to meet the needs of the process industries:

- Open or reverse vane impeller
- Recessed impeller
- Unitized self priming
- Close coupled

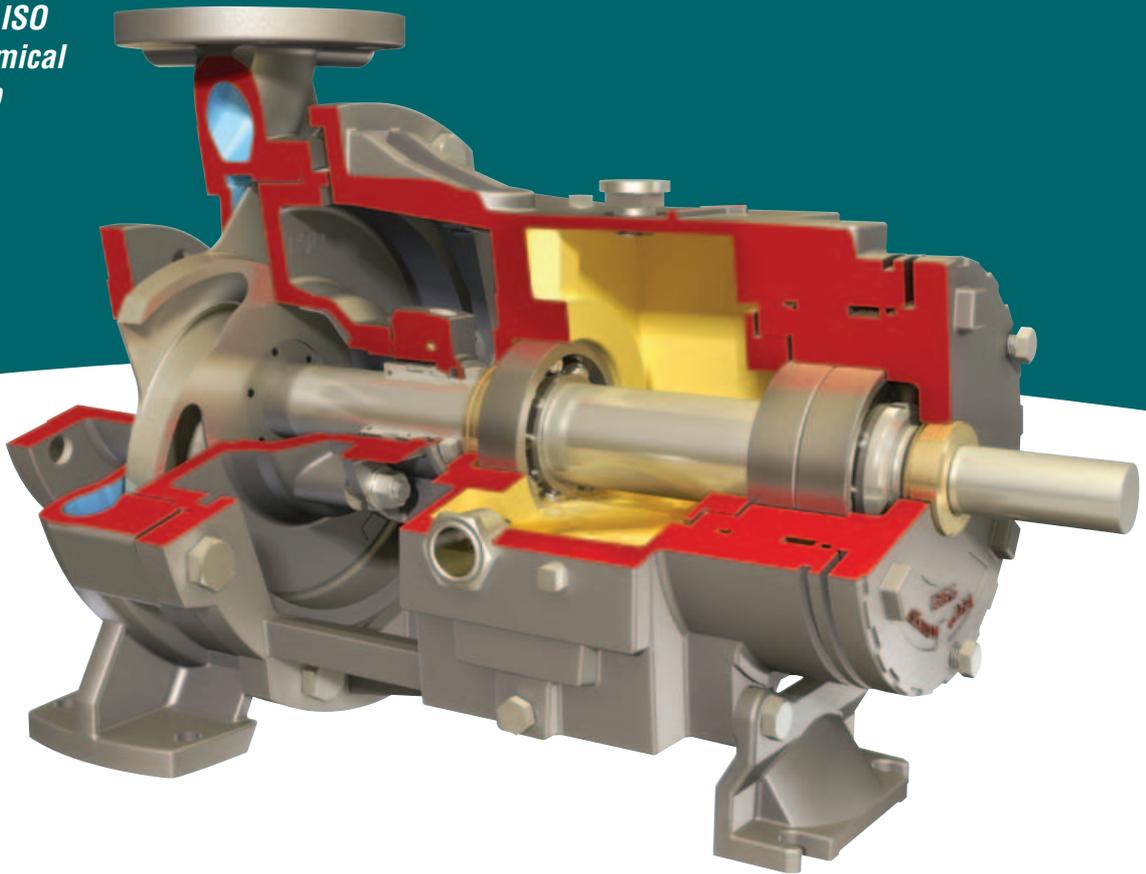
**Typical Applications**

- Acid transfer
- Brine
- Chemical processing
- Petrochemical processing
- Corrosive services
- Food and beverage processing
- Hydrocarbon processing
- Pharmaceuticals
- Polymers
- Pulp and paper
- Sea water
- Slurries
- Solvents
- Steel and primary metals
- Water and wastewater treatment

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**Durco Mark 3 ISO  
Standard Chemical  
Process Pump**



*Conforming to ISO 2858 dimensional and ISO 5199 design criteria and incorporating advanced design features, the Durco Mark 3 ISO chemical process pump provides unmatched performance and reliability. The ruggedly designed Durco Mark 3 ISO offers significant operational and maintenance enhancing benefits that help users to minimize the total cost of pump ownership.*

**Operating Parameters**

- Flows to 1400 m<sup>3</sup>/h (6160 US gpm)
- Heads to 220 m (720 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -80°C (-110°F) to 350°C (660°F)
- Discharge sizes from 20 mm (0.75 in) to 200 (8 in)

**Standards Compliance**

The Durco Mark 3 ISO is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

**Features and Benefits**

**Heavy-Duty Casing** with integral foot and multi-ribbed discharge flange provides superior resistance to pipe loads and improves reliability.

**Reverse Vane Impeller** is the only impeller design that offers repeatable pump performance throughout the life of the pump. Open impellers available.

**SealSentry™ Seal Chamber** extends seal life and provides advanced self-flushing capability.

**Standard Non-Contacting Labyrinth Seals** keep lubricant in and contaminants out.

**Heavy-Duty Radial and Thrust Bearings** selected for long life and reliability.

**External Micrometer Impeller Adjustment Mechanism** accurately sets impeller clearance in 20 seconds, in the shop or the field.

**One-Piece, Ductile Iron Bearing Housing** is designed for safety, maximum concentricity, strength and alignment.

**Back Pull-out Design** allows removal of rotating element without removing casing, piping or motor.

### Typical Applications

- Acid transfer
- Caustic and chlor-alkali
- Man-made fibers
- Polymers
- Slurry processing
- Solvents
- Volatile organic compounds
- Waste processing



### Reverse Vane Impeller Lowers Total Cost of Pump Ownership

The Durco Mark 3 ISO pump features a reverse vane impeller for unequalled efficiency and performance. This exclusive Durco design lowers the total cost of pump ownership by easing maintenance and extending bearing and seal life.

- Optimal, predictable seal chamber pressure and thrust loads
- Abrasive wear is on the rear cover rather than the more expensive casing
- In-shop impeller adjustment with the only impeller design that takes full advantage of the back pull-out feature
- Repeatable performance assurance

### SealSentry Seal Chamber Technology Helps the Bottom Line

The Mark 3 ISO pump incorporates Durco SealSentry seal chamber technology. This Vaalar Award winning seal chamber features unique flow modifiers which reduce pump operating costs and increase pump availability:

- Improves mechanical seal performance, reliability and life
- Reduces maintenance and repair costs
- Permits the use of less expensive seals and flush plans

### Reliability Enhancing Construction

- Precision machined, metal-to-metal inter-connecting faces at the casing, seal chamber and bearing housing for reliable sealing and optimum concentricity
- Robust, solid shaft ensures less than 0.05 mm (0.002 in) deflection at the seal face and low  $L^3/D^4$  ratio, thereby extending mechanical seal life
- Elimination of gaskets avoids leakage and crevice corrosion

### 40 Sizes Available

- 15 Frame 1
- 12 Frame 2
- Nine Frame 3
- Four Frame 4

The Durco Mark 3 ISO standard pump is offered in a wide range of materials to meet application needs. Refer to page 13 for more information.

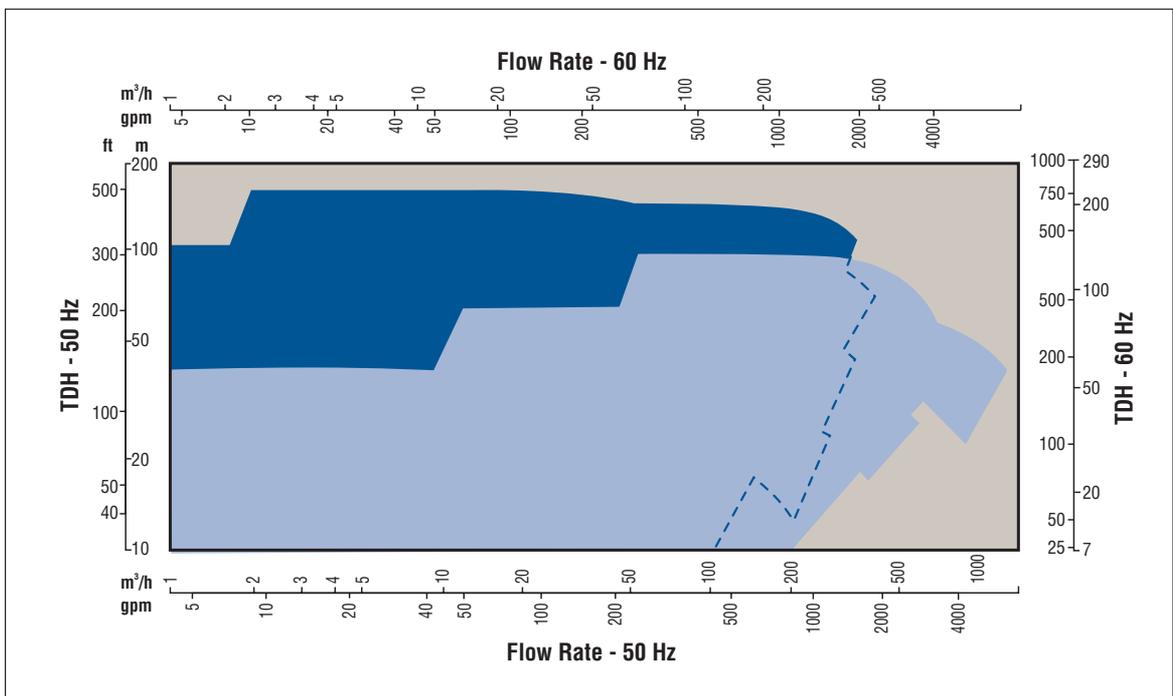
### Optional Casing Designs

- **A Jacketed Casing** is available for those applications in which the pumped fluid must be heated or cooled to maintain optimal fluid viscosity.
- **A Centerline Mounted Casing** is available for applications in which loads caused by thermal expansion need to be reduced.

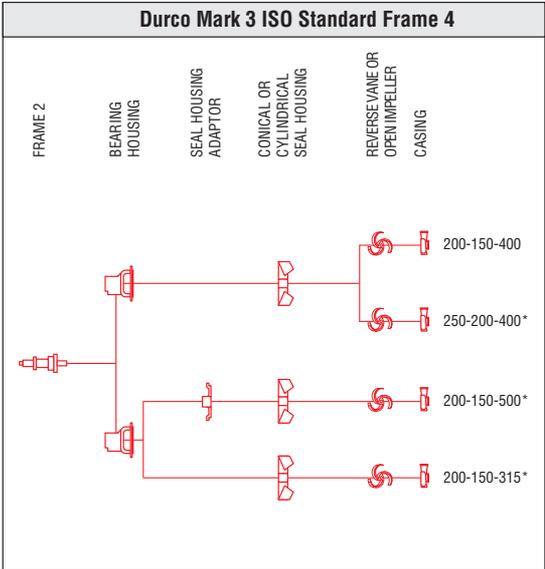
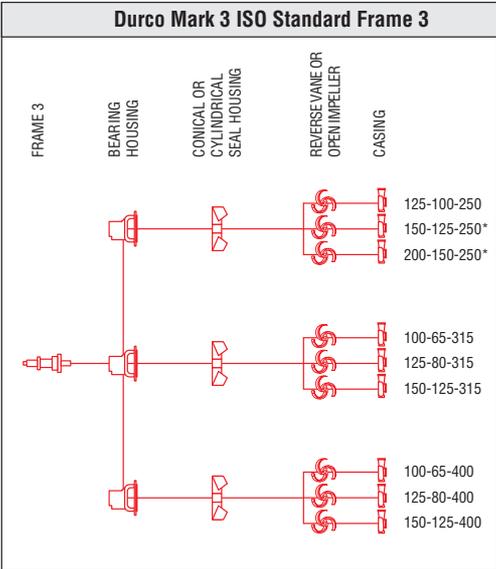
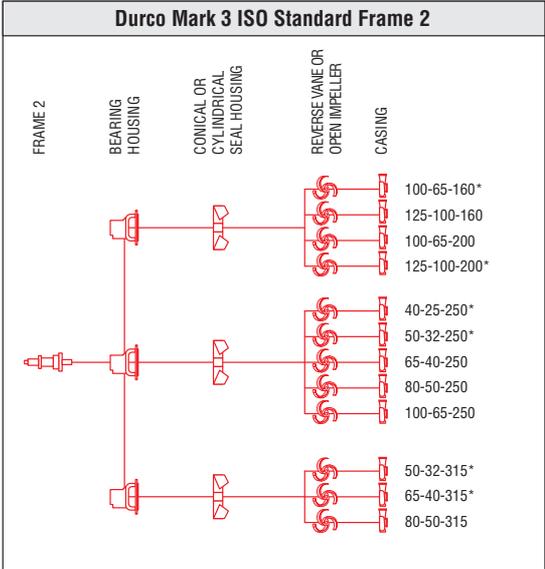
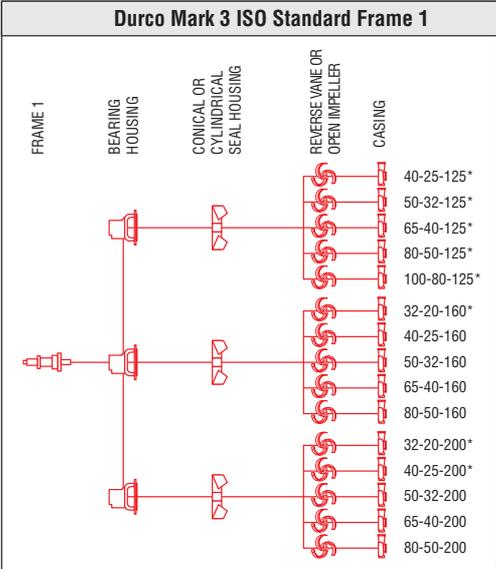
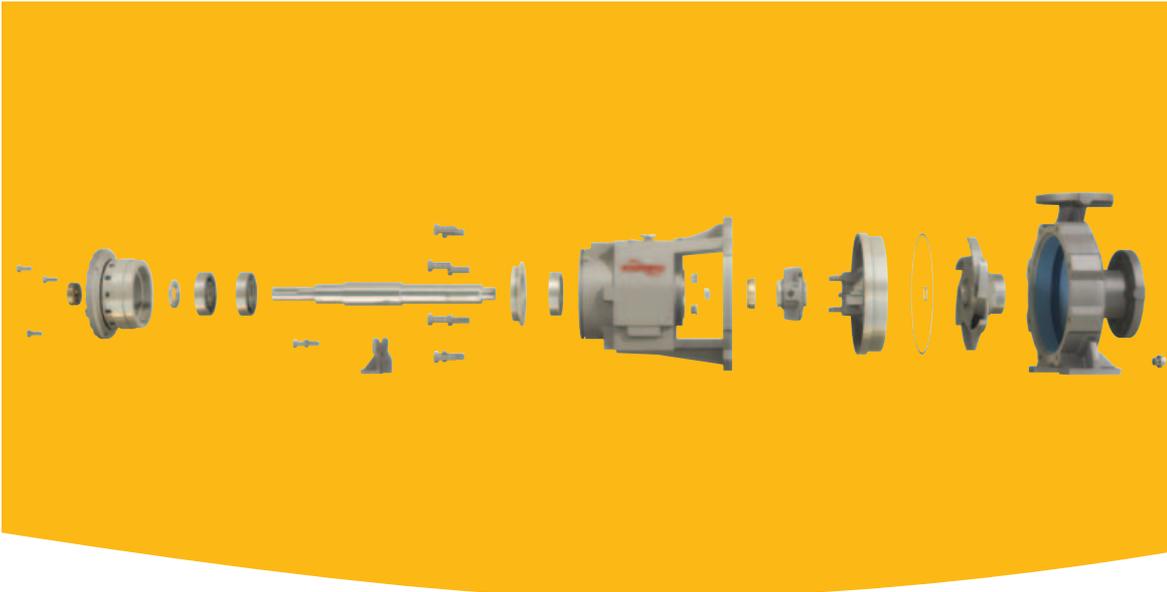
*Durco Mark 3 ISO  
Performance Curves*



**Durco Mark 3 ISO Range Chart**

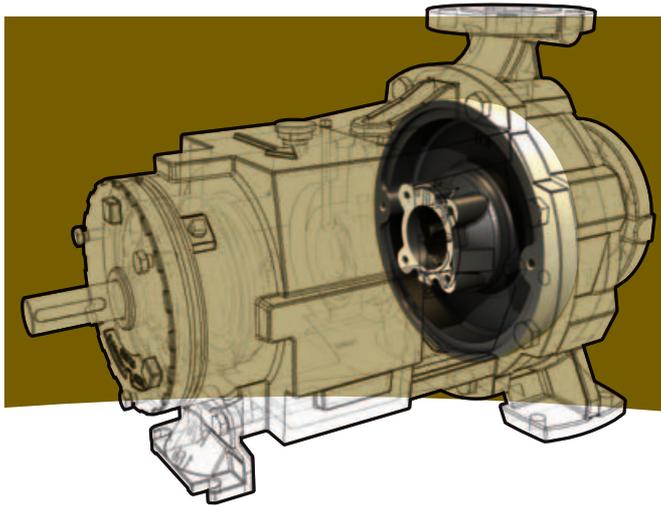


**Durco Mark 3 ISO  
Parts  
Interchangeability**



\*Open impeller only.

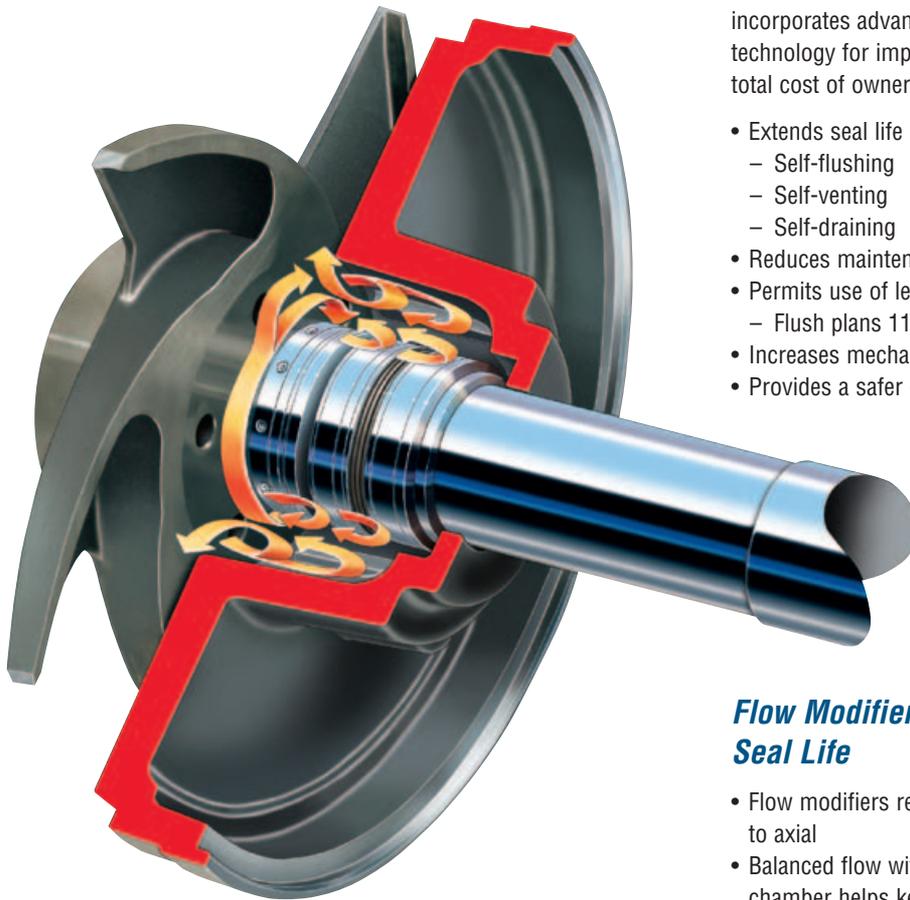
*Durco Mark 3 ISO  
SealSentry  
Seal Chambers*



**Advanced Seal Chamber Technology**

The Durco Mark 3 ISO chemical process pump incorporates advanced SealSentry seal chamber technology for improved pump reliability and reduced total cost of ownership.

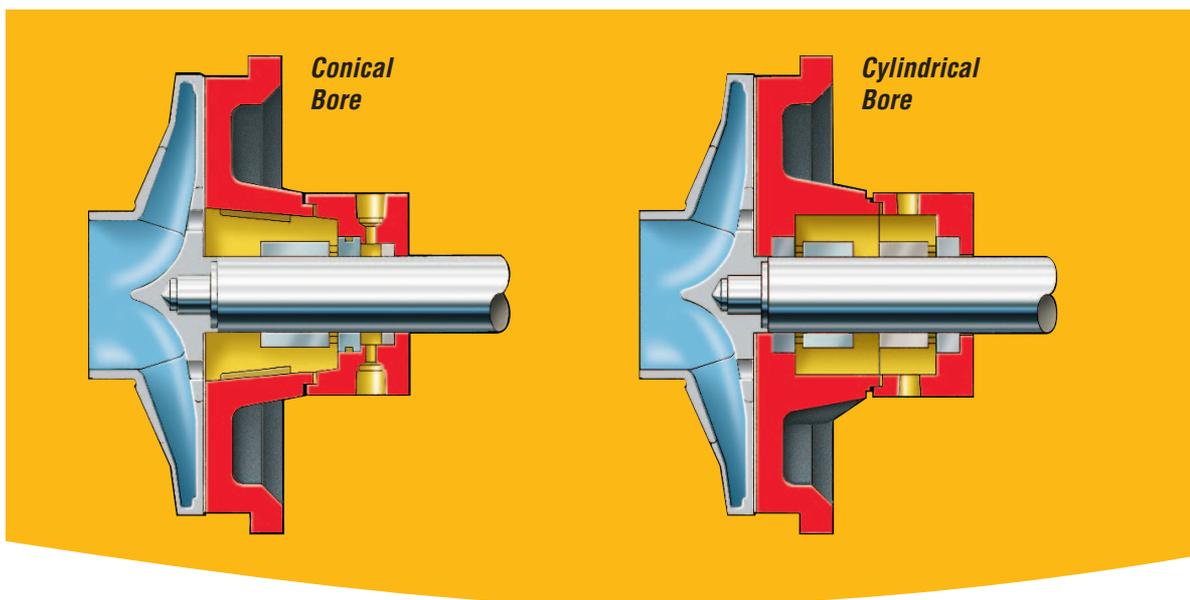
- Extends seal life
  - Self-flushing
  - Self-venting
  - Self-draining
- Reduces maintenance and repair costs
- Permits use of less expensive seals and flush plans
  - Flush plans 11, 32, 52, 53, etc., can be eliminated
- Increases mechanical seal life
- Provides a safer environment for personnel



**Flow Modifiers Extend Mechanical Seal Life**

- Flow modifiers redirect flow from circumferential to axial
- Balanced flow with low-pressure drop in the chamber helps keep solids in suspension, minimizing erosion
- The mechanical seal creates a centrifuging action away from its parts
- Solids and slurry merge into the returning flow path and are flushed out of the seal chamber

*Durco SealSentry seal chambers extend seal life, improve pump reliability and reduce the total cost of pump ownership.*



### **Two SealSentry Designs to Suit Application Requirements**

The Durco Mark 3 ISO is available with two SealSentry seal chamber designs:

#### **Conical Bore**

The conical bore SealSentry seal chamber is preferred for most applications. This innovative design features flow modifiers to redirect flow out of the seal chamber. The conical design is ideal for:

- Single internal cartridge seals
- Dual internal/external cartridge seals
- Single internal component seals with flexibly mounted seats
- Dual internal “true” tandem design cartridge seals
- Single seals with all seat mounting configurations

#### **Cylindrical Bore**

Designed with an oversized cylindrical step bore, the cylindrical seal chamber is ideal for seals with large gland bolt and gasket circles. The cylindrical design may be used with:

- Dual internal component seals that isolate the seal chamber from the process with external barrier fluid
- Single seal with throttle bushing and flush to boost pressure over flash point
- Packing arrangements and conventional seals with small gland bolt and gasket circles

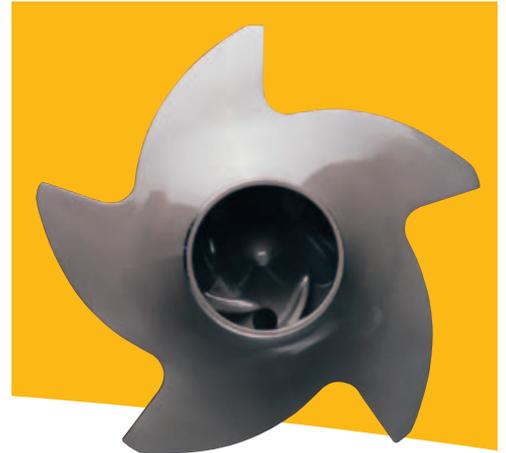
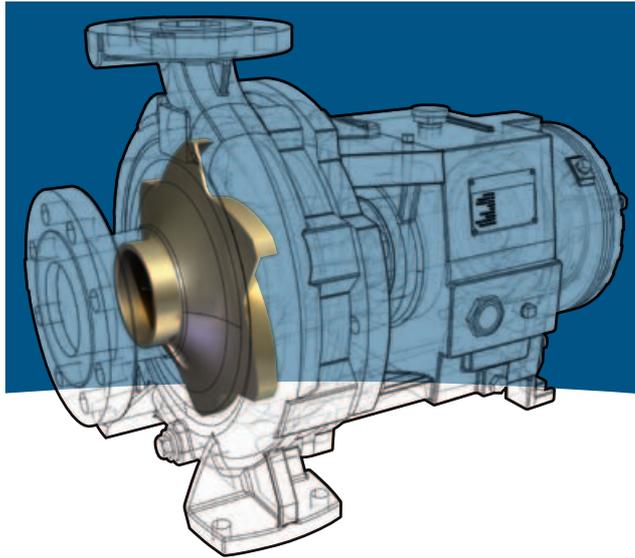
**Conical Bore      Cylindrical Bore**

### **Jacketed SealSentry Seal Chambers Available**

Jacketed seal chambers are designed for effective heat transfer in the seal chamber area or across the entire surface area of the process fluid.

- Use the jacketed conical seal chamber when protection of the process temperature is important
- Use the jacketed cylindrical bore when seal chamber cooling is the objective

**Durco Mark 3 ISO Impellers**



**Reverse Vane Impeller Delivers Efficiency and Performance**

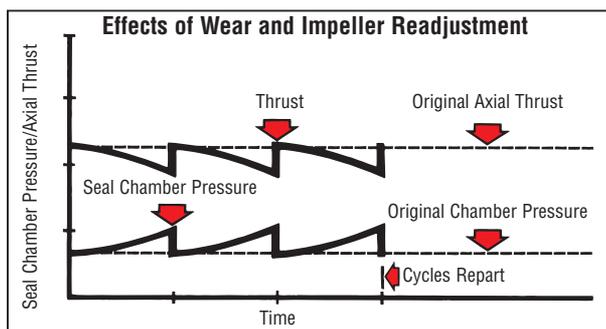
The Durco reverse vane impeller delivers excellent efficiency and performance, while extending bearing and seal life. The result is reduced total cost of pump ownership.

- **Predictable, Repeatable Seal Chamber Pressure and Thrust Loads** mean the mechanical seals last longer
- **Rear Cover** takes the abrasive wear instead of the more expensive casing
- **Easy Impeller Adjustment** – whether in the shop or in the field – with the only impeller design that takes full advantage of the back pull-out feature

**Predictable, Repeatable Performance**

The exclusive Durco reverse vane impeller has only one set of pumping vanes and one critical tolerance.

Typically, wear on most impeller types causes axial thrust loads to decrease as the seal chamber gap widens. Seal chamber pressure also increases. By adjusting the setting of the reverse vane impeller against the cover, however, the original seal chamber pressure and axial thrust loads are re-established. The result is consistent, like-new performance.



**External Micrometer Enables In-shop Impeller Adjustment**

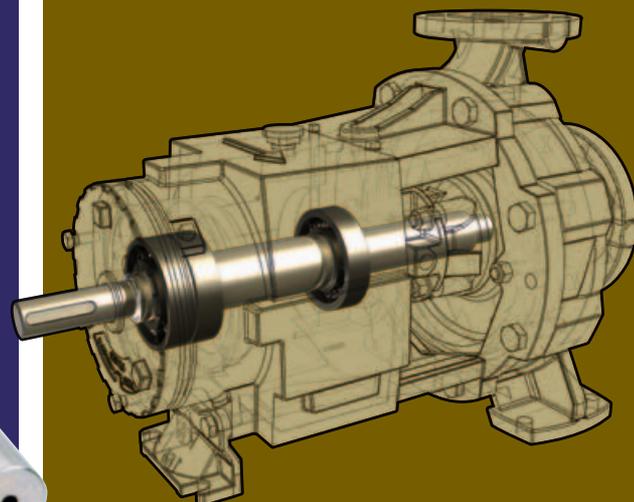
Durco's unique external micrometer impeller adjustment mechanism is simple to use and reduces maintenance time. Most importantly, it is precisely accurate.



**Available Semi-Open Impeller**

The Durco Mark 3 ISO also is available with a precision cast semi-open impeller with a single shroud and Francis vane. Fully interchangeable with the reverse vane impeller, it is an excellent choice for applications containing fibrous or stringy materials and services requiring high shear against the casing.

## Durco Mark 3 ISO Shafts and Bearings



The Durco Mark 3 ISO shaft and bearings system is designed to improve pump performance and reliability.

### Solid Shaft Design

The robust and stiff solid shaft ensures less than 0.05 mm (0.002 in) shaft deflection at the seal face and provides a low  $L^3/D^4$  shaft stiffness ratio<sup>(1)</sup> to maximize mechanical seal life.

#### Durco Mark 3 ISO Shaft Stiffness Ratio ( $L^3/D^4$ )

Frame Size	$L^3/D^4$	
	Solid Shaft	Sleeved Shaft
1	3.51	5
2	1.78	2.35
3	0.94	1.37
4	1.07	1.51

A sleeved shaft is available with the Durco Mark 3 ISO pump, though Flowserve recommends using a solid shaft because it better mitigates the harmful effects of deflection and vibration. While a shaft sleeve may simplify maintenance, a solid shaft reduces it. Furthermore, the proper selection of the shaft material and mechanical seal design will offset the positive features of the shaft sleeve option.

To meet application requirements, shafts are available in a wide range of corrosion-resistant materials, including:

- 316 stainless steel
- Duplex stainless steel
- Alloy 20
- Alloy C
- Alloy B

(1) The formula  $I = L^3/D^4$  offers an index of deflection to compare pump designs where: I = index of deflection; L = length of shaft overhang from bearing; and D = rigid shaft diameter. While this index can provide an approximate comparison of shaft stiffness, a detailed analysis should be made to determine actual shaft deflection.

### Robust Bearing System

As standard, the Durco Mark 3 ISO is supplied with a deep groove ball bearing and double row angular contact thrust bearing, providing life in excess of the minimum specified by ISO 5199.

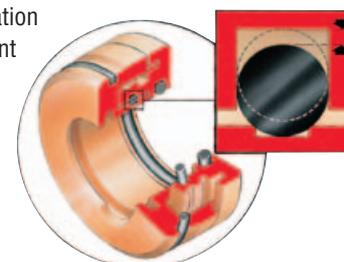
As an optional upgrade, the Durco Mark 3 ISO can be supplied with a deep groove ball bearing and reinforced duplex, back-to-back angular contact thrust bearings, providing  $L_{10}$  bearing life in excess of 50 000 hours.

### Lubrication Options

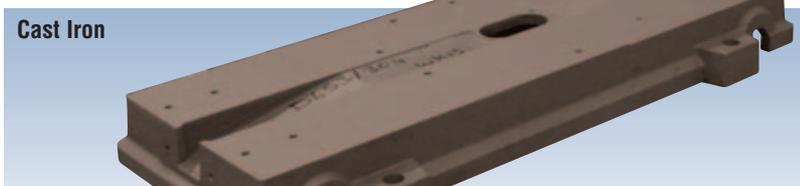
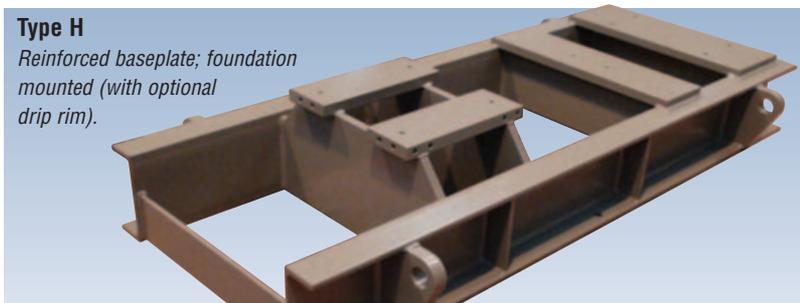
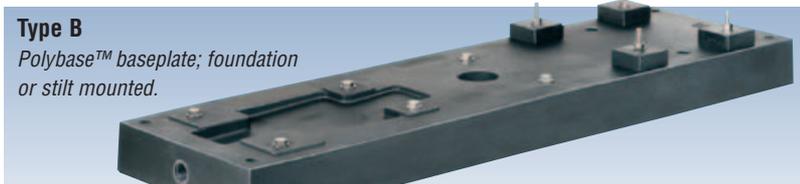
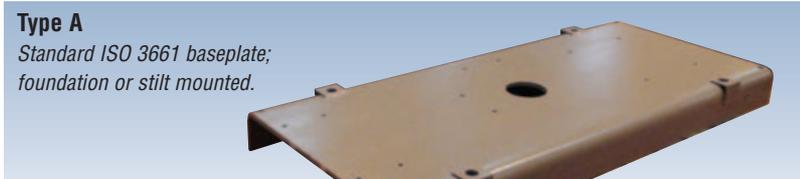
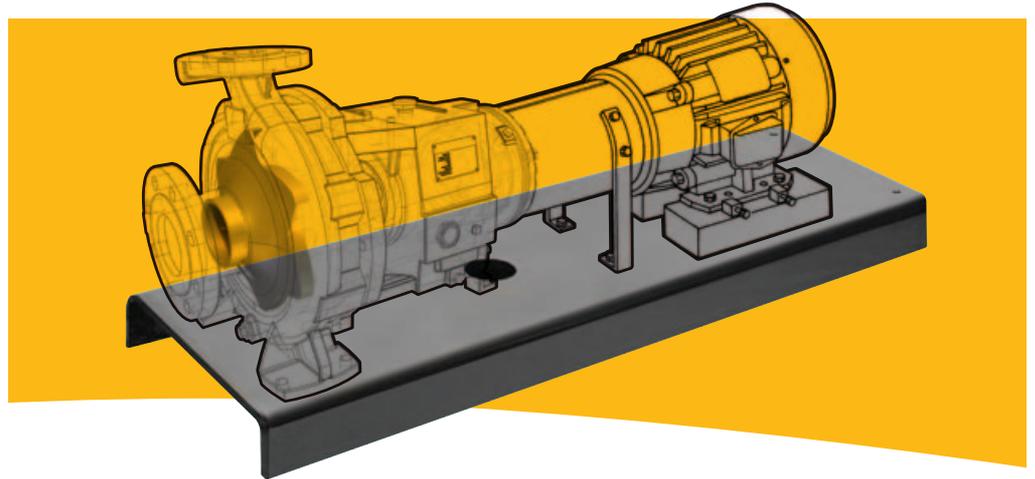
- **Oil Lubricated Bearing Housing Splash Bath** uses a bull's-eye sight glass with magnetic drain plug as standard with constant level oiler as an option.
- **Grease Lubricated Bearing Housing** facilitates maintenance by using grease nipples fitted at the pump end and drive end. Alternatively, sealed-for-life bearings can be fitted.

### Additional Options

- Sealed-for-life bearings
- Additional condition monitoring points
- Tappings for instrumentation and monitoring equipment
- Bearing isolators
- Oil mist lubrication technologies



**Durco Mark 3 ISO  
Pre-Engineered  
Baseplate Designs**



**Four Pre-Engineered  
Baseplates Available**

Flowserve offers four pre-engineered baseplate designs to improve pump performance while reducing costs. This provides versatility in choosing the baseplate that best meets application needs and operating budget.

**Reducing Internal Stress and  
Vibration Extends the Life of  
Pump and Motor Packages**

Pump users specify rigid baseplate designs to:

- Provide torsional lateral and longitudinal rigidity
- Improve vibration dampening
- Protect against transit damage
- Resist twisting during installation
- Maintain shaft alignment
- Reduce installation and shaft alignment time
- Reduce diaphragming or separation from grout
- Improve pump, motor and seal reliability
- Reduce total life cycle pump, motor and seal costs

**Durco Mark 3 ISO  
Materials of  
Construction**

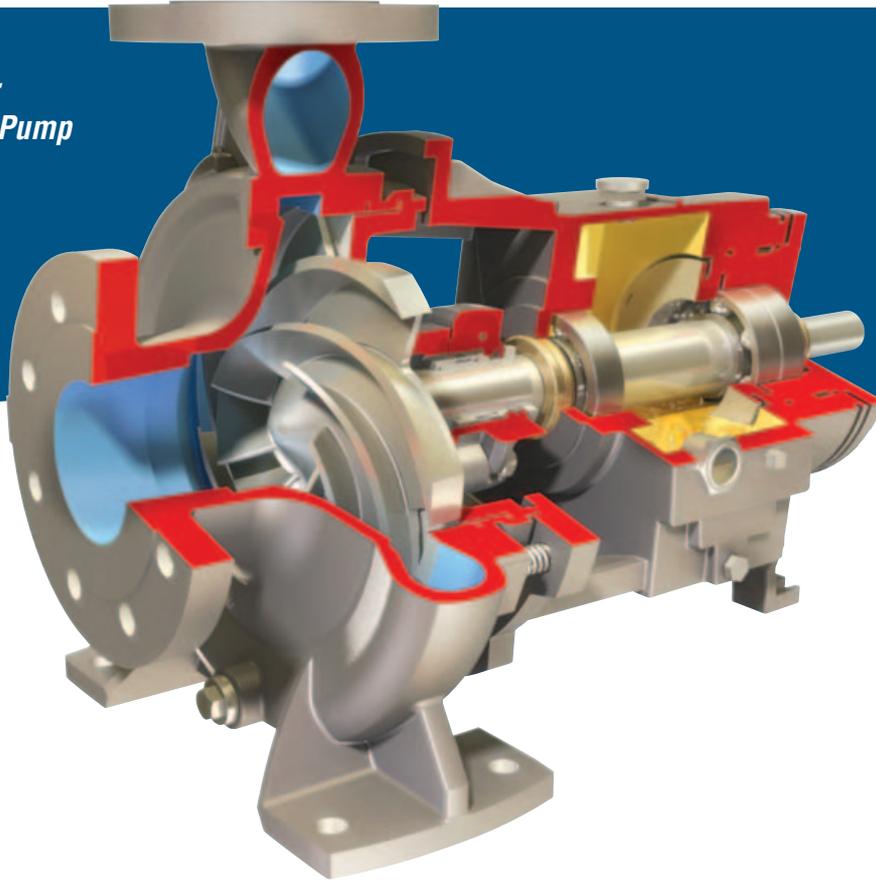


**Standard Materials of Construction\***

Construction	Casing and Seal Housing	Impeller	Solid Shaft	Sleeved Shaft Option		Bearing Housing
				Shaft	Sleeve	
Ductile Iron	Ductile Iron	Reverse Vane: 316 Stainless Steel	316 Stainless Steel	Carbon Steel	316 Stainless Steel	Ductile Iron
Carbon Steel	Carbon Steel					
304 Stainless Steel	304 Stainless Steel					
316 Stainless Steel	316 Stainless Steel	Open: Duplex Stainless Steel	Duplex Stainless Steel	Carbon Steel	Duplex Stainless Steel	
Duplex Stainless Steel	Duplex Stainless Steel					
Alloy 20	Alloy 20	Alloy 20	Alloy 20	Stainless Steel	Alloy 20	
Alloy C	Alloy C	Alloy C	Alloy C		Alloy C	
Alloy B	Alloy B	Alloy B	Alloy B		Alloy B	

\*Specialty materials available. Consult your Flowserve sales engineer for details.

**Durco Mark 3 ISO  
Recessed Impeller  
Chemical Process Pump**



*The Durco Mark 3 ISO Recessed Impeller pump provides low-shear pumping of friable solids and trouble-free pumping of stringy or fibrous slurries. It combines the state-of-the-art hydraulics of the standard Mark 3 ISO pump with the vortex action of a recessed impeller.*

The Durco Mark 3 ISO Recessed Impeller pump boasts a wide clearance at the front of the semi-open impeller, allowing passage of larger particles. Solids are drawn into the vortex of swirling liquid and discharged by centrifugal force through the open area in front of the impeller with little contact, minimizing particle degradation. Furthermore, the air and gas-handling capability of the pump is improved.

**Operating Parameters**

- Flows to 750 m<sup>3</sup>/h (3300 US gpm)
- Heads to 100 m (330 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -80°C (-110°F) to 350°C (660°F)

**Standards Compliance**

The Durco Mark 3 ISO Recessed Impeller is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

**Features and Benefits**

**Vortex Action** causes only a fraction of the media to contact the impeller, minimizing abrasive wear and maintaining solids integrity.

**Heavy-Duty Casing** with integral foot and multi-ribbed discharge flange provides superior resistance to pipe loads and improves reliability.

**Precision Cast, Semi-Open Impeller** in CD4MCuN duplex stainless steel (standard) provides excellent corrosion and wear resistance.

**SealSentry Seal Chamber** extends seal life and provides advanced self-flushing capability.

**External Micrometer Impeller Adjustment Mechanism** accurately sets impeller clearance in 20 seconds, in the shop or the field.

**Standard Non-Contacting Labyrinth Seals** keep lubricant in and contaminants out.

**Heavy-Duty Pump End and Drive End Bearings** selected for long life and reliability.

**One-Piece, Ductile Iron Bearing Housing** is designed for safety, maximum concentricity, strength and alignment.

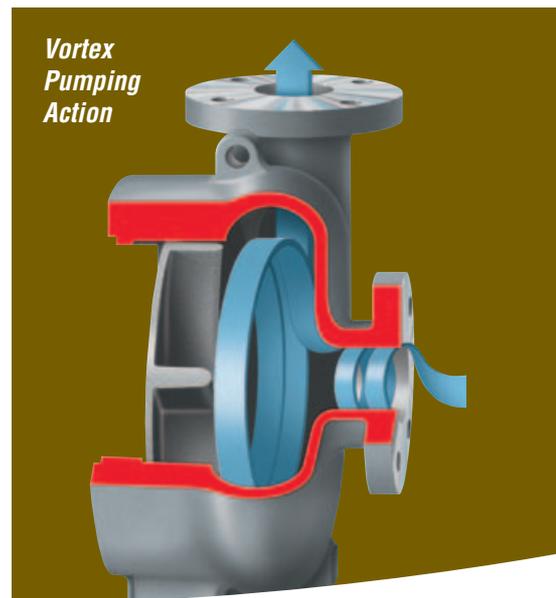
**Back Pull-out Design** allows removal of rotating element without removing casing, piping or motor.

### Typical Applications

- Light slurries
- Corrosive/erosive services
- Large diameter solids
- Waste streams
- Shear-sensitive fluids
- Friable solids
- Fibrous materials



### Vortex Pumping Action



### Benefits of the Durco Mark 3 ISO Recessed Impeller Pump

- Improved solids handling
- Improved air and gas handling
- Improved ability to pass fibrous or stringy substances
- Reduced wear
- Low NPSHR

### High-Efficiency Semi-Open Impeller

The Durco Mark 3 ISO Recessed Impeller pump comes standard with a precision cast semi-open impeller to ensure peak energy efficiency and low NPSHR. The design incorporates pump-out vanes and shroud cut-outs that prolong mechanical seal or packing life by:

- Ensuring low, positive seal chamber pressure
- Expelling solids from critical seal areas
- Providing axial hydraulic balance

### Vortex Pumping Action

The vortex created by the spinning impeller does the pumping with less than 20% of media contacting the impeller. Abrasive wear is minimized and solids integrity maintained.

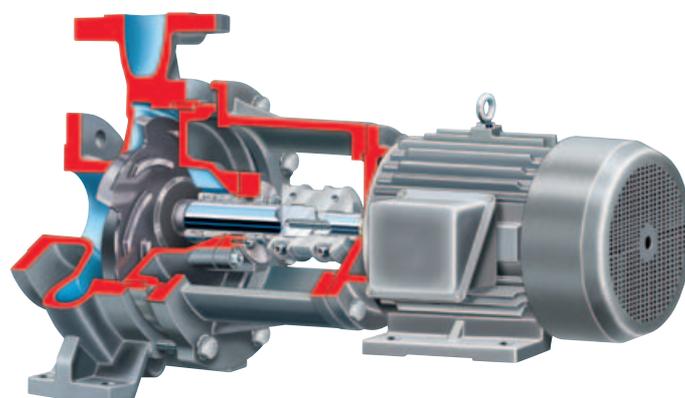
### 10 Sizes Available

- Four Frame 1
- One Frame 2
- Four Frame 3
- One Frame 4

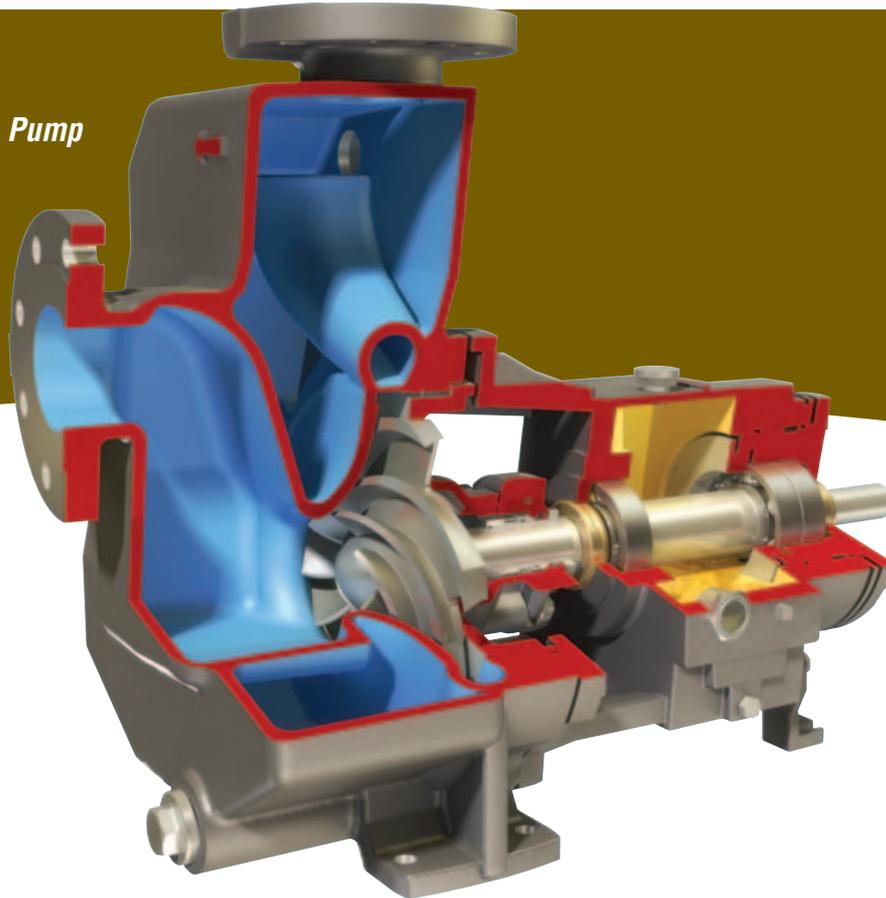
Offered in a wide range of materials to meet application needs. Refer to page 13 for more information.

### Additional Configurations

- Recessed impeller, vertical sump pump
- Recessed impeller, close coupled



**Durco Mark 3 ISO  
Self-Priming  
Chemical Process Pump**



*Costing less to buy, install and maintain than submersible pumps, the Durco Mark 3 ISO Self-Priming pump is designed to draw liquid from sources below ground level or from sources with no positive pressure to naturally prime the pump. Its compact design enables it to fit in tight clearance locations. It can be easily mounted on a trailer for movement to various pumping locations such as wastewater lagoon service.*

**Operating Parameters**

- Flows to 100 m<sup>3</sup>/h (440 US gpm)
- Heads to 100 m (330 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -80°C (-110°F) to 350°C (660°F)

**Standards Compliance**

The Durco Mark 3 ISO Self-Priming is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

**Features and Benefits**

**One-Piece Casing** has large priming chamber, air separator and volute in one integral component, keeping components to a minimum.

**Semi-Open Impeller** delivers high efficiency performance, provides low NPSHR and offers good solids handling.

**Reflux Priming Principle** eliminates the need for internal valves and external priming devices.

**Run Dry Capability** allows for minimal supervision.

**SealSentry Seal Chamber** extends seal life and provides advanced self-flushing capability.

**External Micrometer Impeller Adjustment Mechanism** accurately sets impeller clearance in 20 seconds, in the shop or the field.

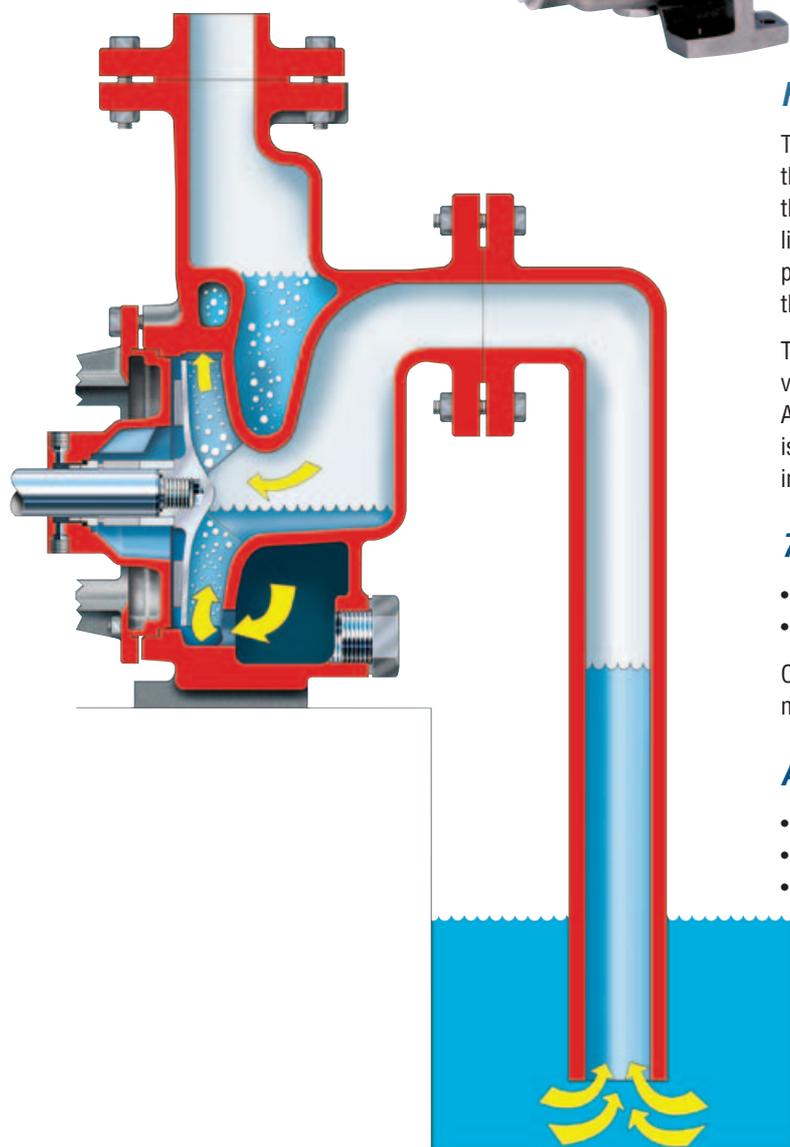
**Standard Non-Contacting Labyrinth Seals** keep lubricant in and contaminants out.

**Heavy-Duty Pump End and Drive End Bearings** selected for long life and reliability.

**Back Pull-out Design** allows removal of rotating element without removing casing, piping or motor.

### Typical Applications

- Sump service
- Tanker unloading
- Marine and river extraction
- Wastewater and effluent
- Dewatering
- Vessel transfer



### Reflux Priming Principle

The Durco Mark 3 ISO Self-Priming pump operates on the reflux principle, using liquid recirculation to prime the pump. The pressure differential between the aerated liquid at the impeller and the non-aerated liquid in the priming chamber creates a vacuum that pulls liquid up the pipe.

This principle eliminates the need for both internal valves and external priming devices or foot-valves. As a result, the Durco Mark 3 ISO Self-Priming pump is ideal for suction lift applications or where a process involves pumping a liquid with air or gas phases.

### 7 Sizes Available

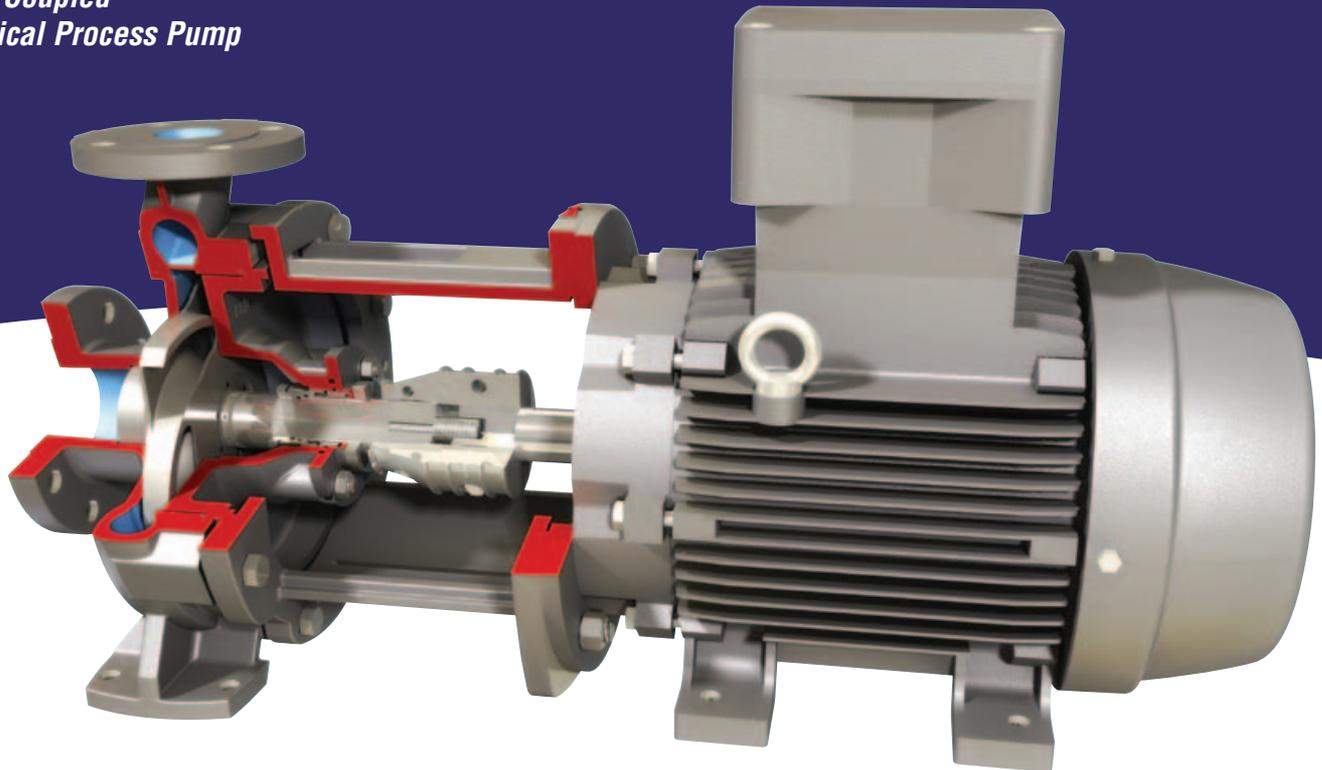
- Six Frame 1
- One Frame 2

Offered in a wide range of materials to meet application needs. Refer to page 13 for more information.

### Additional Configurations

- Close coupled, self-priming pump
- Magnetically driven, self-priming pump
- Close coupled, magnetically driven, self-priming pump

**Durco Mark 3 ISO  
Close Coupled  
Chemical Process Pump**



*With pump ends conforming to ISO 2858 dimensional and technical standards and to ISO 5199 design criteria, the Durco Mark 3 ISO Close Coupled pump provides a compact, space-saving arrangement ideal for industrial processes or installations where space is at a premium. Durco Mark 3 ISO Close Coupled pumps are fitted with standard, readily available electric motors so the user can choose an enclosure to suit the application.*

**Operating Parameters**

- Flows to 570 m<sup>3</sup>/h (2500 US gpm)
- Heads to 100 m (330 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -80°C (-110°F) to 350°C (660°F)

**Standards Compliance**

The Durco Mark 3 ISO Close Coupled is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

**Features and Benefits**

**Close Coupling** eliminates influence of the baseplate and foundation on alignment.

**Radiating Surfaces** dissipate heat and extend bearing and mechanical seal life.

**External Impeller Adjustment Mechanism** can be carried out without taking measurements (micrometer on coupling).

**Heavy-Duty Casing** with integral foot and multi-ribbed discharge flange offers superior resistance to pipe loads.

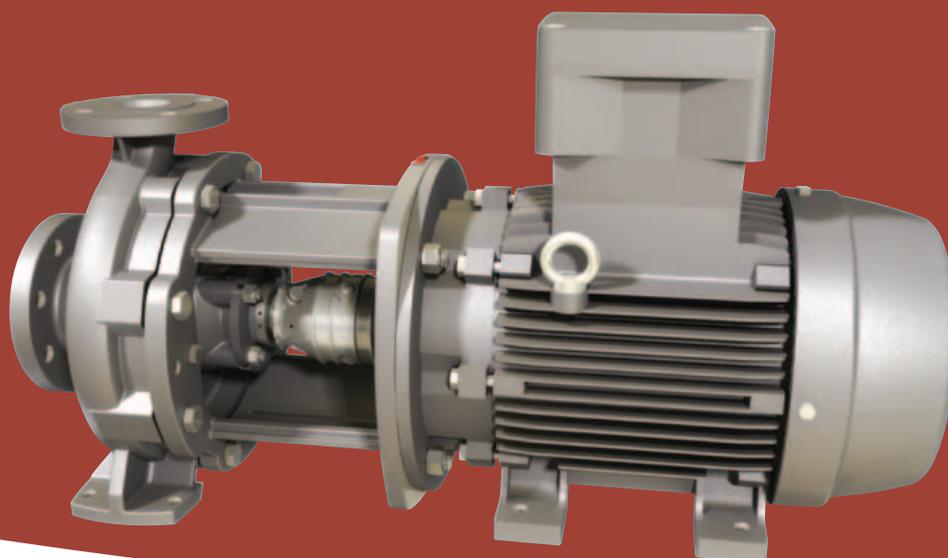
**Reverse Vane Impeller** is the only impeller design that offers repeatable pump performance throughout the life of the pump. Open impellers available.

**SealSentry Seal Chamber** extends seal life and provides advanced self-flushing capability.

**Back Pull-out Design** allows removal of rotating element without removing the casing or the piping.

### Typical Applications

- Acid transfer
- Caustic and chlor-alkali
- Man-made fibers
- Polymers
- Slurry processing
- Solvents
- Volatile organic compounds
- Waste processing

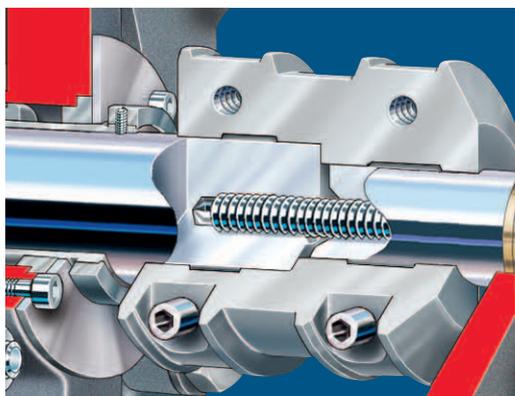


### Benefits of the Durco Mark 3 ISO Close Coupled Pump

- Permits use of readily available standard electric motors
- Provides a thermal barrier between the pump and motor
- Reduces installation cost by eliminating pump to motor alignment
- Serves as an additional deflector between the mechanical seal and motor

### Muff Coupling

The muff coupling is investment cast in two halves (WCB steel). Notches at 30° increments around the circumference of the coupling assist in setting the impeller face clearance.



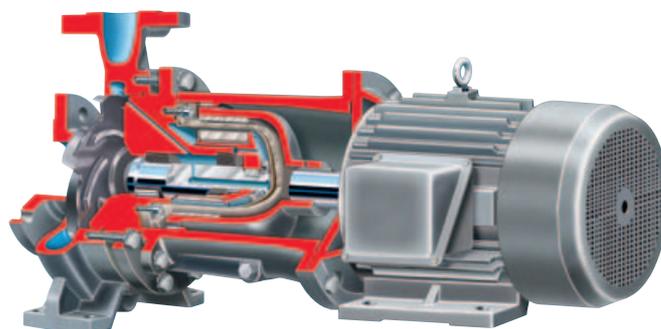
### 33 Sizes Available

- 15 Frame 1
- 12 Frame 2
- Six Frame 3

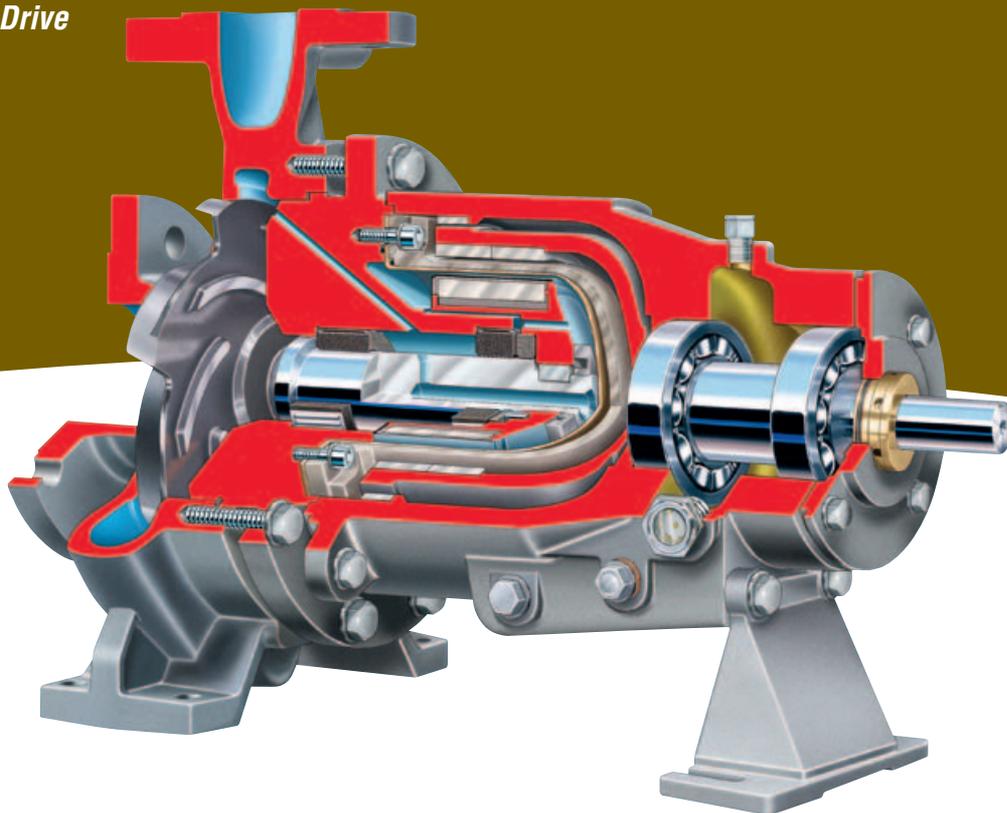
Offered in a wide range of materials to meet application needs. Refer to page 13 for more information.

### Additional Configurations

- Close coupled, recessed impeller pump
- Close coupled, self-priming pump
- Close coupled, magnetic drive pump



**CPXS Magnetic Drive  
ISO Chemical  
Process Pump**



*The CPXS Magnetic Drive pump provides leak-free pumping of hazardous, toxic, flammable, explosive or valuable liquids. Conforming to ISO 2858 dimensional and ISO 15783 design criteria, the CPXS Magnetic Drive pump is found wherever reliability in severe services is a requirement. And, upgrading mechanically sealed pumps to magnetically driven, sealless pumps is easy due to ISO 2858 interchangeability.*

**Operating Parameters**

- Flows to 420 m<sup>3</sup>/h (1850 US gpm)
- Heads to 160 m (525 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -40°C (-40°F) to 250°C (480°F)

**Standards Compliance**

The CPXS is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification.

**Features and Benefits**

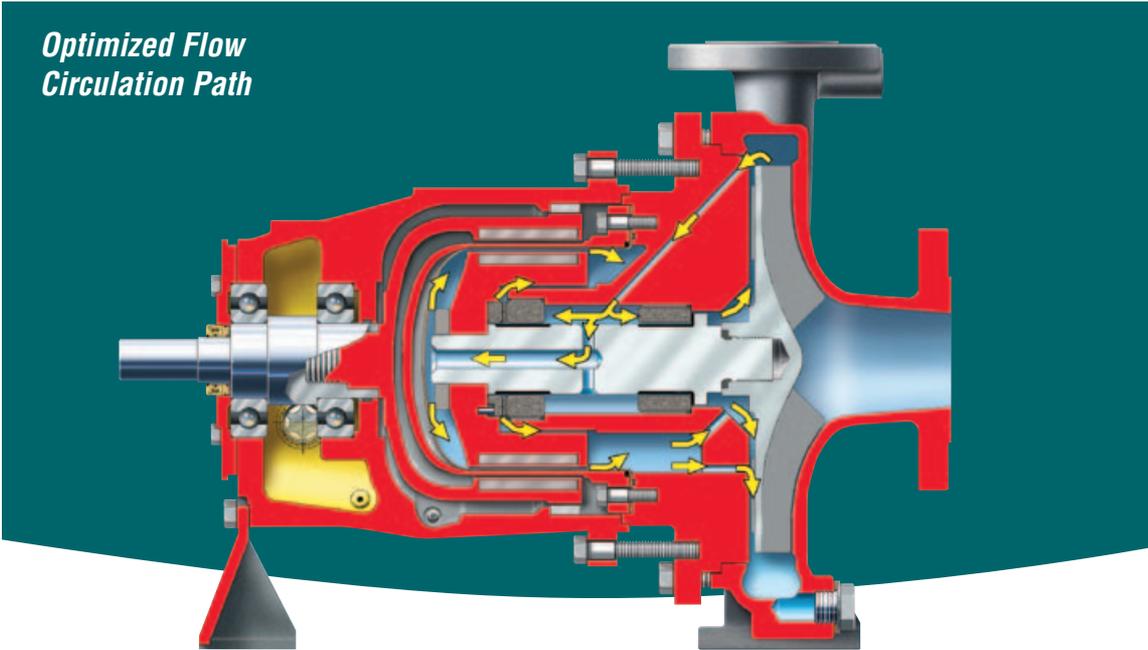
- High-Performance Rare Earth Magnets** possess superior permanent strength and proven reliability.
- Large Inner Magnet Clearances** of 1.5 mm (0.06 in) between shell and inner magnet assembly ensure effective cooling.
- Reinforced PEEK Primary Containment Shell** eliminates eddy current losses, enhancing efficiency.
- Hastelloy® Primary Containment Shell** may be specified.
- Heavy-Duty Casing** with integral foot and multi-ribbed discharge flange provides outstanding resistance to pipe loads.
- Semi-Open Impeller** delivers high-efficiency performance and provides low NPSHr.

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**Typical Applications**

- Sodium hydroxide
- Solvents
- Difficult-to-seal liquids
- Flammable liquids
- Ultrapure liquids
- Valuable liquids
- Toxic services

**Optimized Flow Circulation Path**



**Optimized Flow Circulation Path Analysis**

The CPXS pump design features an optimized internal flow circulation path to ensure adequate bearing lubrication and to cool the magnets. This design also prevents vaporization in the drive unit and its associated damage.

**Optional Secondary Containment Shell**

A hydroformed Hastelloy secondary containment shell is available for added security.



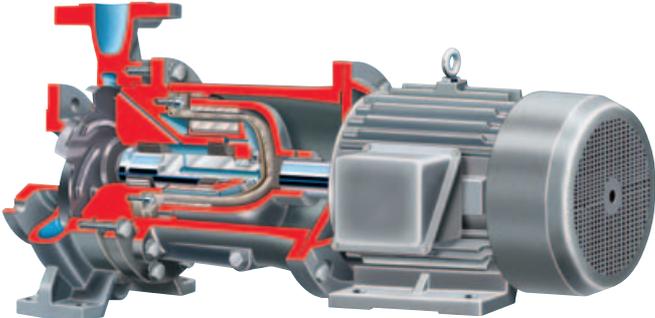
**20 Sizes Available**

- 14 Frame 1
- Six Frame 2

Offered in a wide range of materials to meet application needs. Refer to page 13 for more information.

**Additional Configurations**

- Close coupled, magnetic drive pump
- Self-priming, magnetic drive pump



**Standard or Contained Back Pull-out**



**Standard Back Pull-out** is used for general maintenance and inspection. The casing stays in-line and piping connections remain intact.



**Contained Back Pull-out** is used for drive end maintenance. The process fluid is fully contained; no draining, purging or exposure to harmful process fluids.

**CPXV**  
**ISO and API Vertical**  
**Sump Pump**

*The Flowserve CPXV is a vertical sump pump incorporating state-of-the-art hydraulic design for efficient and reliable service. The CPXV can be customized to meet a wide range of needs. Compliant with ISO 5199, the CPXV is available in more than 40 hydraulic wet-ends and numerous materials of construction. It is also available with multiple mechanical seal options and sump depths. And, for oil and gas installations, the CPXV is available with many ISO 13709/API 610 compliant features.*

**Operating Parameters**

- Flows to 1400 m<sup>3</sup>/h (6160 US gpm)
- Heads to 250 m (820 ft)
- Pressures to 25 bar (365 psi)
- Temperatures from -40°C (-40°F) to 350°C (660°F)

**Standards Compliance**

The CPXV is CE marked and compliant with applicable directives such as ATEX and is available with GOST certification. A configuration that is suitable for zone Ø hazardous area beneath the soleplate is available.

**Features and Benefits**

**Heavy-Duty Casing** with integral foot and multi-ribbed discharge flange provides superior resistance to pipe loads.

**Standard Semi-Open Impeller** design delivers high-efficiency performance. Reverse vane impeller available.

**Additional Column Lengths** are provided up to a maximum of 10 m (32 ft).

**Heavy-Duty Thrust Bearings** with axial adjustment made above soleplate level.

**Recessed Impeller** version is available for enhanced solids-handling capability.

**Suction Strainer** is optional.

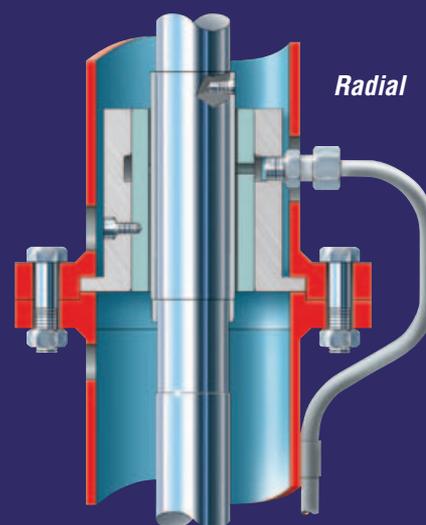
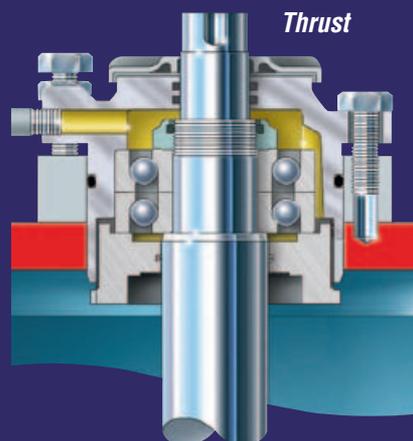
**Fully Jacketed** version available for molten sulfur applications.



## Typical Applications

- Drain Pit
- Slop Tank
- Lift Pump
- Sump Pump

## Bearing Arrangements



## Robust Bearing System

The thrust bearing on the CPXV is a back-to-back angular contact arrangement. Grease lubrication is standard with a grease nipple provided for relubrication. Oil lubrication is an option.

The CPXV's radial line bearings are a sleeve arrangement and are available in a number of material options, offering compatibility across a whole spectrum of liquids. The standard material for radial bearings on the CPXV is Fluorosint®, a mica filled and stabilized PTFE. This material possesses broad chemical resistance and offers a low wear rate. It is suitable for pumped liquids up to 100°C (212°F) with standard clearances. Other options include PEEK®, alpha sintered silicon carbide and Graphalloy®. Radial bearings can be flushed by product or an external source. Strainers can be fitted as an option.

## Couplings

The standard coupling on the CPXV is an elastomeric split element coupling. This coupling provides a maintenance-free solution. An optional spacer coupling (shown at right) is available. Other coupling types are also available upon request.



## Mechanical Seal Options

A variety of mechanical seal options are available for shaft sealing at the soleplate. Choices range from simple vapor sealing designs to tandem cartridge configurations.

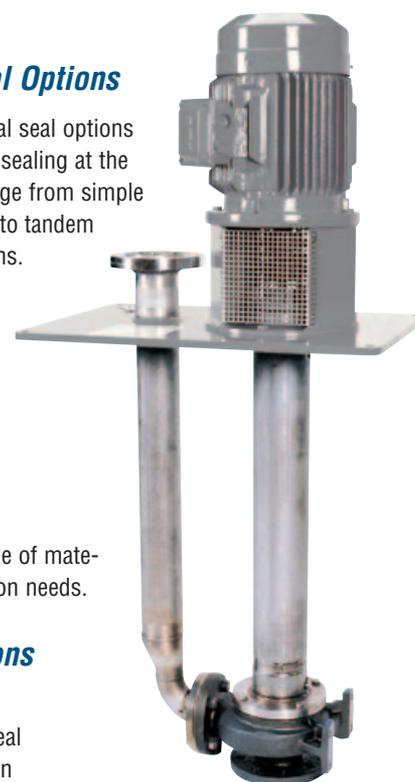
## 40 Sizes Available

- 15 Frame 1
- 12 Frame 2
- Nine Frame 3
- Four Frame 4

Offered in a wide range of materials to meet application needs.

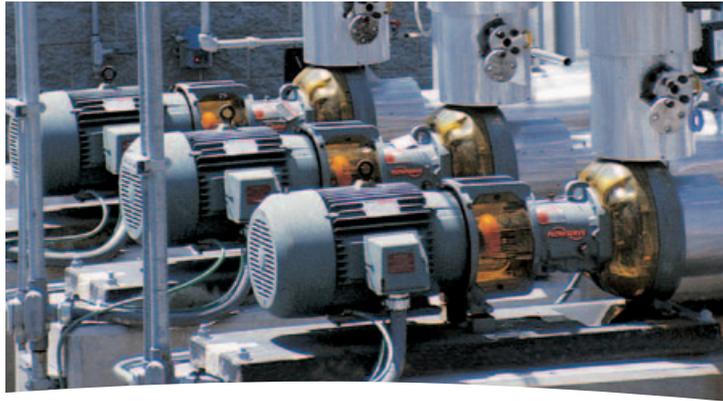
## Additional Options

- Recessed impeller
- Vapor/mechanical seal
- Fully jacketed version
- Motor enclosures
- Rectangular or circular soleplates
- Circular ASME (ANSI) Class 150/300 RF soleplate
- Spacer coupling
- Oil lubrication to thrust bearing



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 © Graphalloy is a registered trademark of the Graphite Metallizing Corporation.  
 © PEEK is a registered trademark of Victrex PLC.

**Complementary  
Pumps**



## Durco Mark 3 Chemical Process Pumps

With its reverse vane impeller, SealSentry seal chambers and the optional ANSI 3A™ power end, the Durco Mark 3 is recognized worldwide as the premier name in ASME (ANSI) chemical process pumps.

### Mark 3 ASME (ANSI) Standard

Conforming to ANSI B73.1 and incorporating advanced design features, the rugged Mark 3 pump provides unmatched performance and reliability in countless applications throughout the worldwide process industries.

**Operating Parameters**

- Flows to 4540 m<sup>3</sup>/h (20 000 US gpm)
- Heads to 215 m (700 ft)
- Pressures to 27 bar (400 psi)

### Mark 3 Sealmatic

The Mark 3 Sealmatic pump uses a dynamically sealing repeller to expel fluid from the seal chamber, eliminating the need for mechanical seals in tough to seal services.

**Operating Parameters**

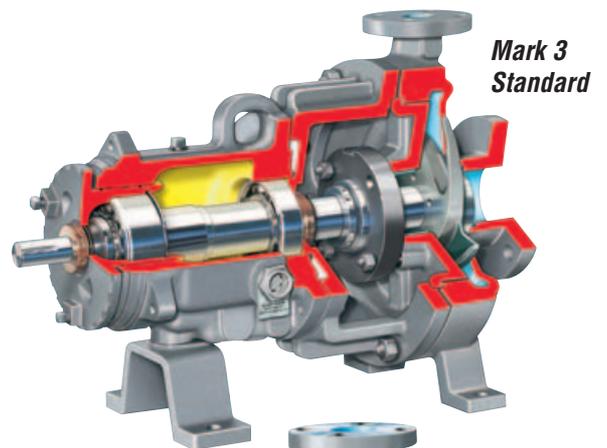
- Flows to 1680 m<sup>3</sup>/h (7400 US gpm)
- Heads to 230 m (755 ft)
- Pressures to 31 bar (450 psi)

### Mark 3 Recessed Impeller

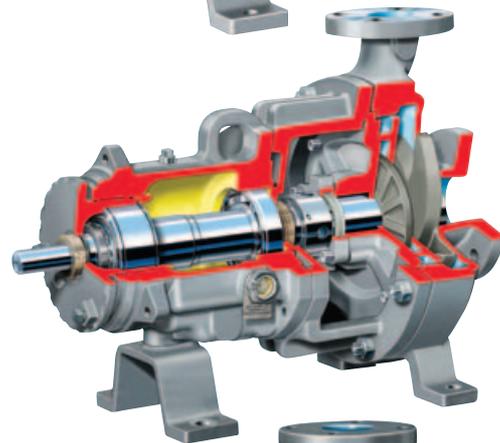
The Mark 3 Recessed Impeller pump combines the best features of the Mark 3 ANSI Standard pump with the vortex action of a recessed impeller to minimize abrasive wear while maintaining solids integrity.

**Operating Parameters**

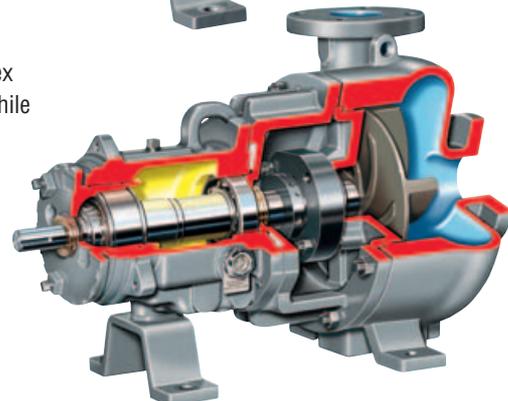
- Flows to 455 m<sup>3</sup>/h (2000 US gpm)
- Heads to 120 m (400 ft)
- Pressures to 20 bar (285 psi)



**Mark 3  
Standard**



**Mark 3  
Sealmatic**



**Mark 3  
Recessed  
Impeller**

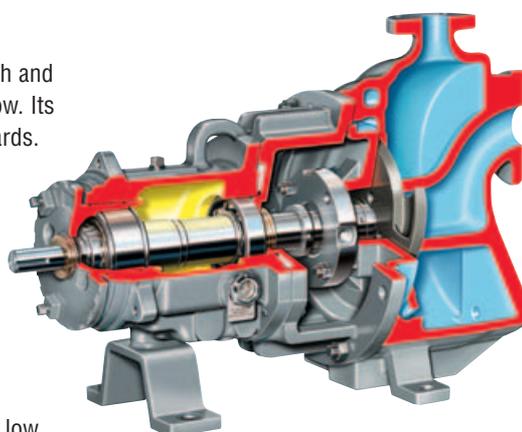


### **Mark 3 Unitized Self-Priming**

The Mark 3 Unitized Self Primer is designed to sit high and dry at ground level and draw from liquid sources below. Its footprint conforms to ANSI B73.1 dimensional standards.

#### **Operating Parameters**

- Flows to 320 m<sup>3</sup>/h (1400 US gpm)
- Heads to 120 m (400 ft)
- Pressures to 20 bar (285 psi)
- Static suction lift to 6 m (20 ft)



**Mark 3 Unitized Self-Priming Pump**

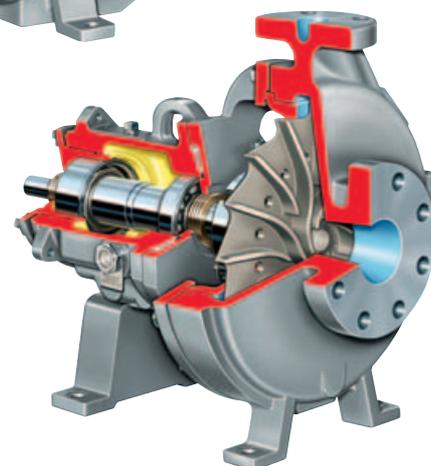
### **Mark 3 Lo-Flo**

The Mark 3 Lo-Flo pump improves pump reliability at low flows and high heads. Its innovative radial vane impeller and circular, concentric casing reduces radial loads and shaft vibration, extending bearing and mechanical seal life.

#### **Operating Parameters**

- Flows to 50 m<sup>3</sup>/h (220 US gpm)
- Heads to 300 m (985 ft)
- Pressures to 31 bar (450 psi)

**Mark 3 Lo-Flo**

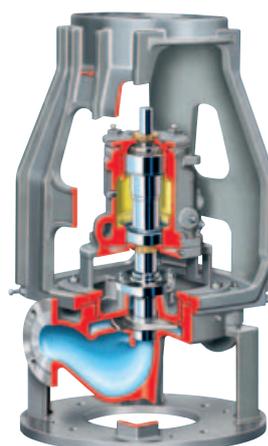


### **Mark 3 In-Line**

Designed to exceed ASME (ANSI) B73.2 criteria, the Mark 3 In-Line pump has its own independent bearing housing and rigid style motor adapter, making it one of the most reliable process pump designs available.

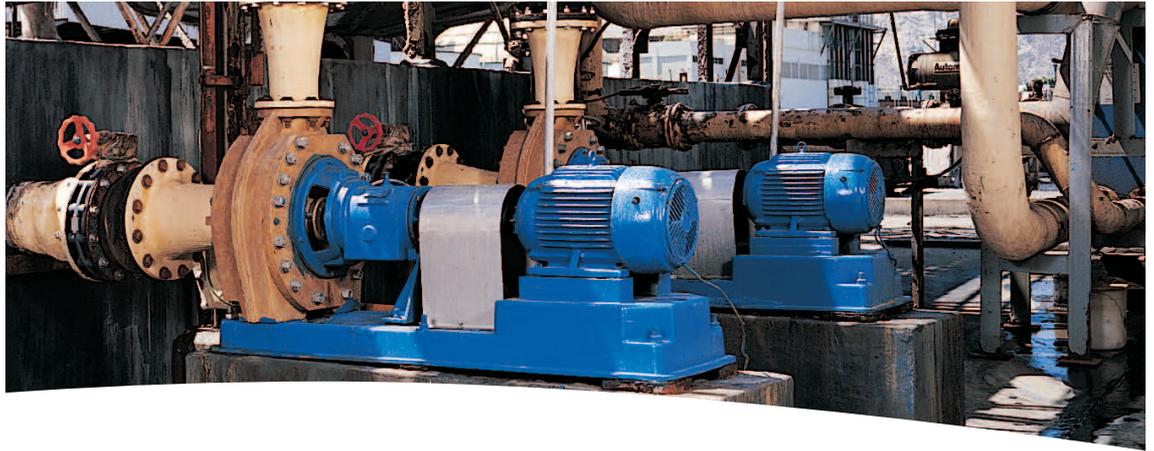
#### **Operating Parameters**

- Flows to 370 m<sup>3</sup>/h (1630 US gpm)
- Heads to 230 m (755 ft)
- Pressures to 24 bar (350 psi)



**Mark 3 In-Line**

**Complementary  
Pumps**



## **PolyChem Non-Metallic Chemical Process Pumps**

Embracing a global approach to pump design, Flowserve offers sealed and sealless PolyChem non-metallic pumps engineered to ASME (ANSI) and ISO design criteria and to JIS drilling specifications. The fluoropolymer lined M-Series and S-Series pumps and the GRP engineered polymer composite pump are well suited for highly corrosive applications in the worldwide process industries.

### **M-Series, Magnetically Driven**

Available in close coupled and long coupled configurations, M-Series pumps provide reliable leak-free performance in demanding applications.

#### **Operating Parameters**

- Flows to 135 m<sup>3</sup>/h (600 gpm)
- Heads to 145 m (480 ft)
- Temperatures to 150°C (300°F)
- Pressures to 17 bar (250 psi)

### **S-Series, Sealed**

Incorporating the proven Durco Mark 3 ISO power end, the S-Series is engineered to maximize performance.

#### **Operating Parameters**

- Flows to 420 m<sup>3</sup>/h (1860 gpm)
- Heads to 145 m (480 ft)
- Temperatures to 150°C (300°F)
- Pressures to 17 bar (250 psi)

### **PolyChem GRP Engineered Composite**

Designed to ASME (ANSI) B73.5M standards, the GRP non-metallic pump possesses corrosion resistance superior to many more expensive, high alloy metals while costing only slightly more than ductile iron.

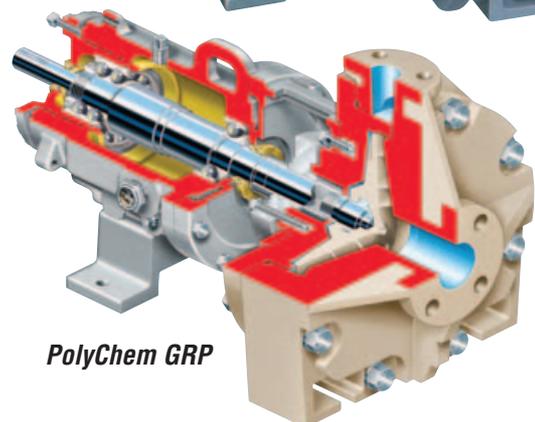
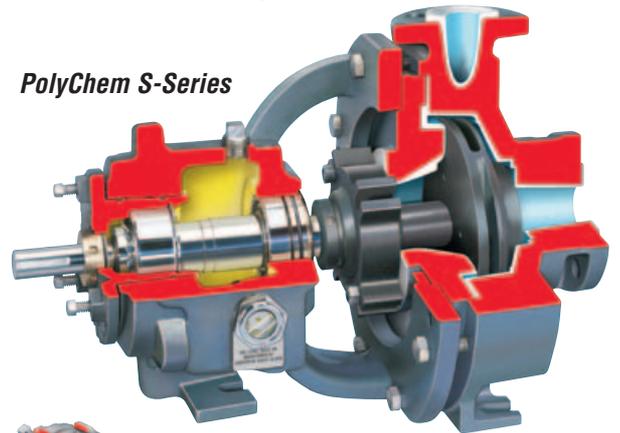
#### **Operating Parameters**

- Flows to 2050 m<sup>3</sup>/h (9000 gpm)
- Heads to 150 m (500 ft)
- Temperatures from -95°C (-50°F) to 120°C (250°F)
- Pressures to 17 bar (250 psi)

**PolyChem  
M-Series**

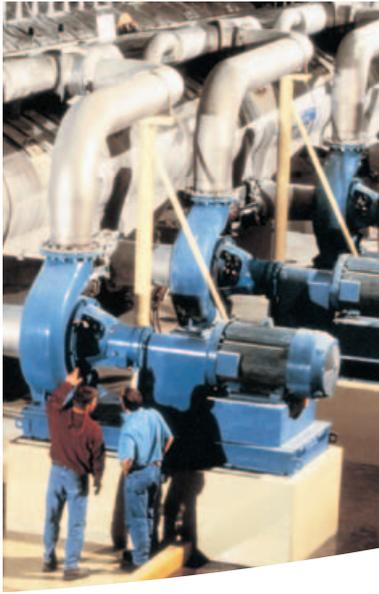
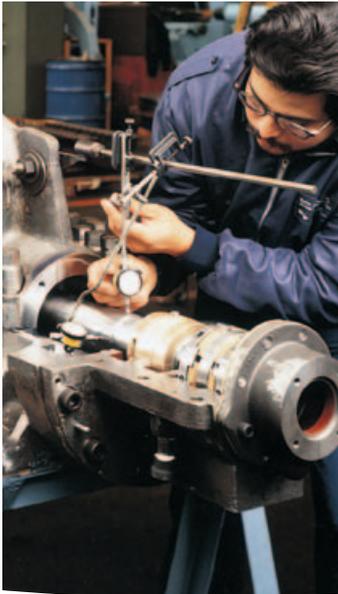


**PolyChem S-Series**



**PolyChem GRP**

**Global Service and Technical Support**



## Life Cycle Cost Solutions

Typically, 90% of the total life cycle cost (LCC) of a pumping system is accumulated after the equipment is purchased and installed. Flowserve has developed a comprehensive suite of solutions aimed at providing customers with unprecedented value and cost savings throughout the life span of the pumping system. These solutions account for every facet of life cycle cost, including:

**Capital Expenses**

- Initial purchase
- Installation

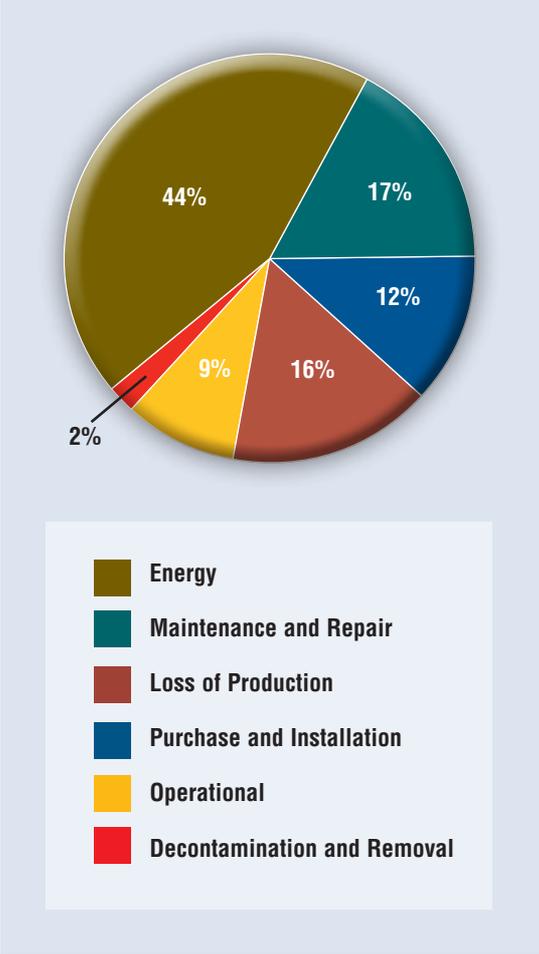
**Operating Expenses**

- Energy consumption
- Maintenance
- Production losses
- Environmental
- Inventory
- Operating
- Removal

**Innovative Life Cycle Cost Solutions**

- New Pump Selection
- Turnkey Engineering and Field Service
- Energy Management
- Pump Availability
- Proactive Maintenance
- Inventory Management

### Typical Pump Life Cycle Costs<sup>1</sup>



<sup>1</sup> While exact values may differ, these percentages are consistent with those published by leading pump manufacturers and end users, as well as industry associations and government agencies worldwide.



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